CENTRE FOR DISEASE CONTROL

THE NORTHERN TERRITORY
DISEASE CONTROL
BULLETIN

Vol. 8, No. 3 , September 2001 ISSN 1440-883X

Rotaviral Gastroenteritis in the NT: a description of the epidemiology 1995-2001 and future directions for research

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Introduction

In 2001, the Northern Territory (NT) experienced the largest outbreak of gastroenteritis due to human rotavirus since surveillance records for the disease were begun in 1994. Epidemics of rotavirus are not uncommon in the NT and sporadic infection continues in the inter-epidemic periods. When gastroenteritis epidemics due to this organism do occur, there is a severe strain on the health services. In a national study analysing hospitalisation rates for acute gastroenteritis in young children, the NT was shown to have the highest admission rates for acute gastroenteritis and for rotavirus [1]. The length of hospital stay was 3 to 5 times longer than any of the states. The reasons for the higher hospitalisation rates and length of hospital stay have not been elaborated on since.

Rotavirus is classified firstly by its serogroup (A-G), with most human infections being caused by serogroup A. Group A rotaviruses can be further subdivided into serotypes (G1-G10), determined in the laboratory by monoclonal antibodies directed against the viral outer capsid glycoprotein VP7, the major epitope associated with a protective immune response. The majority of cases of severe disease in children are caused by serotypes G1-G4. It was against these 4 serotypes that the much heralded rotavirus vaccine, released in 1998, was directed. The vaccine was withdrawn from the market in 1999 when it was linked with an increased risk of intussusception, and no replacement vaccine has since been marketed. In recent years there have been increasing reports of other serotypes emerging as important human pathogens. The G9 serotype is one of these. It first appeared in Australia in 1997, after which it quickly established itself as second in importance to the G1 serotype [2]. The emergence of these serotypes has important implications for future vaccine development.

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TERRITORY HEALTH SERVICES
Northern Territory Government

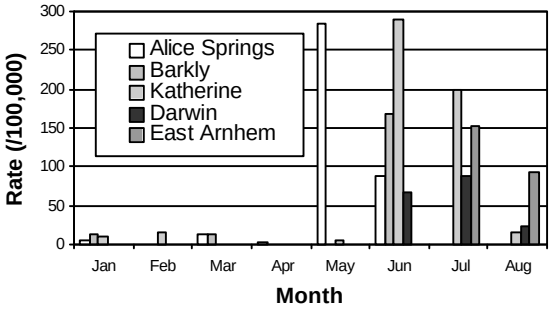
Much remains unclear regarding the spread of rotavirus and factors that facilitate transmission of rotavirus. The faecal-oral route is obviously important but there is also evidence that viral transmission is also droplet-spread via the respiratory route or aerosolisation of infective faeces[3]. The seasonality of rotavirus in temperate regions, where a predictable winter peak occurs, suggests that climatic factors may play a role in facilitating transmission. Investigators in the US have demonstrated a clear pattern of regional movement that is repeated during the annual rotavirus epidemic[4]. A similar phenomenon has been noted in Europe [5]. Tropical regions are far less likely to have seasonal peaks [6]. No distinct seasonality was noted in rotavirus activity between 1993 to 1996, when all hospitalisations were aggregated across different climatic regions. [1]

Unlike other Australian states and territories, rotavirus is a notifiable disease in the NT, and reliable data have been collected since 1995. Serotyping data from the National Rotavirus Reference Centre is available for the past decade. We therefore have a unique opportunity to study a number of aspects of the epidemiology of this disease in the NT. The aim of this preliminary report is to use these data to describe and analyse the 2001 outbreak of rotavirus as well as the epidemiology of rotavirus in the NT since 1995, and to look for ways of addressing unanswered questions in future studies of rotavirus in the NT.

Description of the 2001 Outbreak

The first case of rotavirus during the outbreak was noted in a 23 month old girl from Alice Springs during April 2001. She was admitted to Alice Springs Hospital on 17/01/2001 with diarrhoea, vomiting and mild dehydration. Disease spread was rapid, with cases reported in both the township of Alice Springs itself and simultaneously in a number of widely separated remote communities. With Central Australia as the 'epicentre', the epidemic rapidly spread northward to the Barkly, Katherine and Darwin Health Districts (Figure 1). An outbreak of rotavirus in western Queensland in June was epidemiologically linked to the NT outbreak.

Figure 1 Rotavirus rates per 100,000 by health district and month Jan to Aug 2001



Epidemiology of Rotaviral Gastroenteritis in the NT, 1995-2001

Since 1995, the NT has experienced an epidemic of gastroenteritis due to rotavirus on a biennial basis, 1995,1997,1999 and 2001. In the interepidemic periods of those years, and in non-epidemic years, rotavirus has been endemic. The 4 epidemics analysed in this study have each lasted between 2 and 4 months. The months of peak activity during these epidemics were August, July, April and June, respectively.

The crude notification counts and rates during the 2001 outbreak have been the highest since rotaviral gastroenteritis became a notifiable disease (Figure 2). The age distribution of cases was typical of rotavirus epidemics, with the highest notification rates occurring in the under 1 year age group, and 95% of all cases in the less than 5 year age group. The notification counts by gender showed a slight male preponderance;

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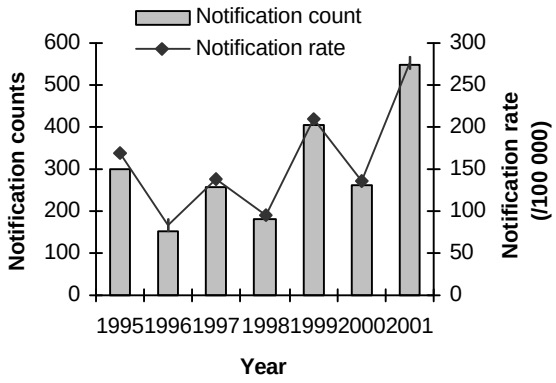
52.1% compared to 47.9%. Throughout the NT in the 2001 epidemic, notification rates among Aboriginal people were approximately 5 times higher than for non-Aboriginal people. This higher notification rate amongst Aboriginal people has been apparent each year since 1995 (Figure 3). Notification rates were higher in Aboriginal children in 2001 in all health districts except Barkly.

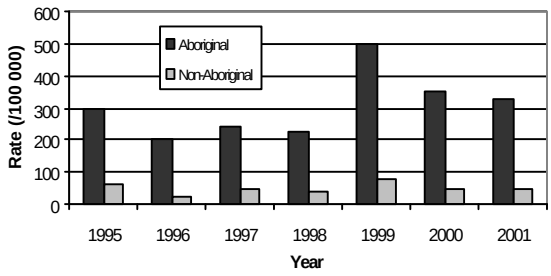
The predominant serotype of rotavirus in the 2001 outbreak was G9. This strain was determined in 72% of samples tested, the remainder being G1 (21.2%) and 6.7% were untypeable. In previous years G1 has predominated, comprising 56.3% of 970 samples collected between August 1989 and December 2000 for which there is serotyping data available. Of the remainder, 4.2% were G2, 0.2% G4, 1.3% G9 and 37.9% were untypeable.

Figure 2 Crude notification counts and rates for rotavirus in the NT by year*



* The year 2001 rates were calculated using counts for the months Jan to Aug and hence will be an underestimate

Figure 3 NT rotatvirus notification rates by Aboriginal status* and year



* Aboriginal status was not stated in 2.3% to 8.3% of total notifications, depending on year

Discussion

By notification counts, the rotavirus epidemic in NT this year has been the largest, and has lasted longer than any of the 4 epidemics recorded since rotavirus surveillance records were begun in 1994. It caused a large, though unquantified, burden on the health resources. In Alice Springs, where the epidemic began and where notification rates were the highest of any health district, hospital administrators were forced to temporarily recruit nurses from Darwin because of the strain on the health services there. Reports from some remote communities suggest very high attack rates in young children. Laboratory notification data represent only a fraction of the true incidence of rotaviral infection. Hospitalisation data can be collected to quantify part of the monetary cost but to quantify the true burden of disease, both in monetary and human terms, the attack rates in the communities must first be estimated. We plan to do this by analysing clinic records of a number of remote communities, and Emergency Department attendances in the larger regional centres.

So why has rotavirus activity been more severe this year? Part of the reason may be due to the unusual serotype (G9) of rotavirus that co-circulated with the more usual G1 serotype during the epidemic. The G9 serotype only appeared in the NT in mid 1999 and hence the population was relatively naive to it. Although infection with a particular strain of rotavirus usually confers at least partial cross protection against infection with other strains, it may be that the G9 serotype is more antigenically distinct than previously circulating strains. In this scenario, the pool of unprotected children would include not only those who have never been challenged with rotavirus before, but also those previously infected with the more common strains. Alternatively, the circulating G9 strain may have been a particularly virulent one. Although increased virulence has not been reported with the G9 serotype, there is emerging evidence that certain rotavirus strains cause more severe disease than others [7].

The biennial peak of rotavirus activity in the NT has not been well appreciated prior to this report and the reasons for it are speculative. A report on rotavirus activity in Central Australia in the 1970s described 2 distinct outbreaks separated by a period of 3 years [8], lending credence to the

hypothesis that rotavirus outbreaks occur at intervals other than yearly. The reason for this may be due to a lack of circulating strains of rotavirus in the remote communities during interepidemic periods (unlike larger centres elsewhere where there is continuous circulation of rotaviral strains) which could lead to a pool of rotavirus-naive infants susceptible to the next epidemic strain. This may also explain the notification rates for Aboriginal children being between 5 and 8 times higher than non-Aboriginal children, the majority of the latter group living in the larger urban settings. The hypothesis that a community needs to have a critical population for endemicity of rotavirus to occur was first postulated in 1983 in a report on rotavirus outbreaks in two communities in Papua New Guinea, disparate in size [9]. A prospective study comparing interepidemic rotavirus carriage (or seroprevalence) in infants from a remote community with those from an urban centre could help answer this question.

It was clear that the 2001 NT rotavirus epidemic had its origins in the Alice Springs urban area, spread rapidly to Alice Springs rural area, then moved northward to the Barkly, Katherine, Darwin Health Districts and finally to East Arnhem. Since 1995 however, there has been no consistent pattern to the movement of rotavirus activity during those years where epidemics occurred. In fact, in the epidemic years prior to 2001, the Alice Springs district was affected *later* in the epidemic than the other health districts. This lack of consistency in the direction of spread has been noted by another Australian group who analysed hospitalisation and serotyping data for the years 1993 to 1996 [10]. Although the seasonality of rotavirus activity is not as predictable as in the more temperate states, our data show a clear association between the drier, cooler months and an increase in rotavirus activity. This is true for the NT as a whole as well as at a district level. By pooling data from all years, the peak number of notifications for the NT occurred in July, whereas at a district level, the peak number of notifications varied from May in the arid Alice Springs district, to July for the Katherine (subtropical) and Darwin (tropical) districts. Barkly and East Arnhem districts showed less convincing peaks and the total numbers were too small to make convincing conclusions. This seasonal pattern of rotavirus activity in the NT contradicts a previous report [1]. The reason for this contradiction maybe due to their use of hospitalisation data as opposed to notification data in this report. Hospitalisation data selects cases with severe disease and gives a less complete picture of rotavirus activity in the community compared to notification data.

In the NT 2001 outbreak, the simultaneous appearance of rotavirus in widely separated, remote Central Australian communities may suggest an environmental trigger as well as a circulating virulent strain of virus. This retrospective study is not the vehicle to adequately shed light on the question of transmission but could provide the background knowledge to enable a prospective, well planned outbreak investigation in the next epidemic to probe this question further.

This early report has uncovered hitherto unrealised information regarding the epidemiology of rotavirus in the NT, and has given a different perspective from previously published information on the seasonality of rotavirus activity. Many questions however remain unanswered: Can any clues be found from the data that may shed light on the routes of transmission of the virus? What is the real burden of disease of rotavirus in the NT? If a new vaccine were to be introduced, what potential benefits could we in the Territory expect to receive? What are the factors that lead to the disproportionate effect of rotavirus on Aboriginal children, and what measures can they be put in place to rectify it? We, along with workers from CDC throughout the Territory and laboratory scientists in the field, will be addressing these questions in ongoing work on rotavirus in the NT.

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New Look

The new cover of the Bulletin reflects the recently developed Centre for Disease Control corporate branding. The map highlights the geographical position of the NT and the close proximity of our northern neighbours .

Comments / Letters to the Editor

Comments, contributions and letters to the Editor are encouraged. Please see previous page for contact details.

Disease Control Workshop

The annual workshop held in Darwin from 18 to 20 September 2001 was well attended by over 50 THS staff and other health professionals. It was the first workshop with invited interstate guests. One guest, Hume Field, due to the Ansett crisis was unable to attend but by the power of powerpoint and a telephone hookup presented 'Emerging Zoonotic Infections—the role of pteropid bats'. Susan Templeman, a media consultant from Sydney did attend and gave a stimulating 2 hours on tricks in the media trade.

This, also, was the first workshop to host international attendees and we were privileged to have the 4 regional coordinators from the East Timor National Tuberculosis Control Program attend. Gil da Costa presented 'Competency based training for TB workers in East Timor'.

Other highlights included Nathan Zweck's 'CDC—Issues around asylum seekers' and a hypothetical involving a Murray Valley Encephalitis outbreak with guest appearances from Joanne Selvey from the Tourism Board, Angela Merianos from the Department of Health and Community Care and formerly from CDC Darwin and the ABC's Michael McKenzie.

Next year's workshop will be held in Alice Springs.

Web Site

www.nt.gov.au/nths/cdc/cdc.shtml

A range of information is available on the CDC website. Materials available include:

- CDC protocols and guidelines
  - Acute post-streptococcal glomerulonephritis
  - Aust bat lyssavirus post exposure prophylaxis
  - Congenital syphilis
  - Diphtheria
  - Gonococcal conjunctivitis
  - Hepatitis A
  - Hepatitis B
  - Leprosy
  - Malaria
  - Meningococcal infection chemoprophylaxis
  - Outbreak investigation
  - Reporting of notifiable conditions
  - Scabies & skin sores, community control
  - Trachoma
  - Tuberculosis
- Fact Sheets
  - Campylobacteriosis
  - Chickenpox & Shingles
  - Cryptosporidiosis
  - Giardiasis
  - Melioidosis
  - Murray Valley Encephalitis
  - Ross River virus
  - Rotavirus infection
  - Salmonellosis
  - Shigellosis
  - Scrub Typhus
- Previous editions of the Bulletin
- NT Childhood and Adult Immunisation Schedules
- Preventable Chronic Disease Strategy
- Chronic Disease Network information

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Knowledge and Practices of Sexually Transmitted Diseases by General Practitioners in the Top End of Australia

Simon Morgan, formerly AIDS/STD Unit, CDC, Darwin

Background

Sexually Transmitted Diseases (STDs) are a significant clinical and public health problem in Australia. STDs have serious potential health consequences, including pelvic inflammatory disease (PID), tubal pregnancy and adverse pregnancy outcomes. There is also very good evidence that the presence of other STDs significantly increases the risk of transmission of HIV.[1]

Infection with an STD is frequently asymptomatic.[2] Therefore, only a minority of patients with an STD may present to a medical service for treatment. This proportion may be further reduced by ignorance of the significance of symptoms, lack of access to services, fear of unpleasant or embarrassing tests and the stigma attached to a diagnosis of an STD.

The Northern Territory (NT) has disproportionately high rates of STDs compared to other states,[3] with significantly higher notification rates in both Aboriginal and non-Aboriginal Territorians. For example, rates of gonorrhoea are 30 times the Australian figure, with rates in NT Aboriginal people 80 times higher. Primary health care providers in all settings in the NT, including its resident GPs, are therefore more likely to be seeing patients with STDs than their southern colleagues.

Given that 80% of Australians attend their GP each year,[4] GPs play a vital role in the prevention, detection, management and surveillance of STDs in this country. Despite this key role, there is only a small amount of published research looking broadly at the knowledge and practices of GPs in relation to STDs and HIV in Australia. Mulvey et al. carried out a comprehensive survey of Victorian GPs in 1997 and found areas where a "lack of understanding or knowledge could be resulting in misdiagnosis or underdiagnosis of particular STDs" [5] There is no published material on GP knowledge and practices in relation to STDs specific to the NT.

Moreover, a recent situation analysis of the practices of THS Darwin remote clinics documented a number of areas where STD management could be improved.[6] It showed that overall little opportunistic testing was being performed and that over 15% of STD episodes were inadequately treated. Immediate empirical treatment was not always given when indicated and the average delay to treatment was almost 2 weeks. Of particular concern, in an area with documented high rates of infertility,[7] the report stated that practitioner awareness of the possibility of PID in women with infection was low and that the management of diagnosed PID was inappropriate in the majority of cases.

With these factors in mind, the following study was designed to identify the knowledge and practices of GPs working in the Top End of the NT in relation to STD management. It sought to complement the work being done in rural areas in order to provide a clearer "snapshot" of the current situation in the Top End. The study was also designed to act as a needs assessment tool for future educational events on STDs for GPs, with the development of a "Short Course in Sexual Health" a proposed result of this process.

Methods

The study employed the use of a questionnaire, developed by the Darwin AIDS/STD Unit. The questionnaire covered 5 sections – demographics, clinical scenarios (see Appendix), clinical practice, epidemiology and general knowledge – with the questions reflecting the STD epidemiology specific to the NT. A pilot of the survey was conducted on hospital medical officers prior to dissemination to GPs. The questionnaire was voluntary and strictly confidential.

Clinical Scenarios

GPs were presented with three clinical scenarios:

1. a female with a genital ulcer (probable HSV)

2. a male with overseas acquired urethral discharge (probable gonorrhoea), and
3. a woman with possible PID.
(For full scenario, see Appendix)

For each scenario, GPs were asked to provide answers to the following:

a) the most likely diagnosis
b) a differential diagnosis
c) investigations required
d) whether presumptive treatment should be offered and
e) treatment given.

The scenarios attempted to approximate real cases and answers were required to be written in free text. The clinical history accompanying each scenario suggested a specific diagnosis but was sufficiently limited that other causes of the clinical presentation could not be excluded. This was designed to identify the extent of syndromic practice in diagnosis and management.

Clinical Practice, Epidemiology and General Knowledge

The survey contained a number of questions relating to clinical practice with regards to STDs, including frequency of screening asymptomatic antenatal patients for infection, the local epidemiology of STDs in the NT and general knowledge of these infections.

The research proposal was registered with the THS Research Group and ethics approval was sought and gained. A collaboration was formed between the AIDS/STD Unit and the Top End Division of General Practitioners (TEDGP) to promote and distribute the survey through the TEDGP monthly newsletter, the Echo. Continuing Medical Education (CME) point application was also sought and gained through the Royal Australian College of General Practitioners for the survey to act as a stand alone educational event for GPs. This was performed to both maximise response rate and to improve the learning experience for participants. To meet CME point requirements, learning objectives and a package of "Best Practice Answers" were developed, and the questionnaire formally evaluated after completion as to its educational worth.

Sample Population

The sample population was defined as all GPs and GP registrars working in the Top End of the NT, including Darwin, Palmerston, Katherine, Gove, Borroloola and remote locations. They were identified by the TEDGP member data base.

Results were analysed using a Microsoft Access database.

Results and Comments

Of 150 surveys sent out, 40% were returned and analysed, with 47 % of respondents being male, 52% from Darwin, 22% from a regional town or Palmerston and 26% from a remote community.

Clinical Scenarios

In scenario 1, the awareness of syphilis and HSV as a cause of genital ulcer disease was high (92% and 95% respectively). However, 18% of GPs did not perform syphilis serology and 26% did not perform a culture for HSV. HIV serology was offered or performed by 64% of GPs.

In scenario 2, all respondents considered gonorrhoea as a cause of male urethritis, with 85% considering chlamydia and 48% non specific urethritis (NSU). Urethral swab culture was requested by 83% and 85% performed a test for chlamydia (either PCR or endourethral swab). Of the 9 GPs that did not test for chlamydia, 6 did not treat for it either. Almost all (97%) of GPs offered presumptive treatment, but in only 47 % of cases, was this treatment appropriate for gonorrhoea acquired overseas.[8] In addition, nearly one third (32%) did not offer any treatment for chlamydia and 4 GPs used long courses of doxycycline or vibramycin where single dose treatment is recommended. HIV serology was offered or performed by 70% of GPs in this scenario.

In scenario 3, 66% of GPs felt PID was the most likely clinical diagnosis. However, only half requested endocervical culture for gonorrhoea, with 78% performing a chlamydia test. Only 42% of GPs offered or performed HIV serology in this scenario.

Clinical Practice

GPs screened antenatal patients for syphilis, HBV and HIV most commonly, with screening frequencies for gonorrhoea and chlamydia considerably lower (Table 1).

Table 1 Frequency of GP screening of antenatal patients for STDs by numbers (percentage)

	Always	Mostly	Sometimes	Rarely
Syphilis	57 (95)	1 (2)	0 (0)	3
HIV	42 (70)	9 (15)	5 (8)	7
HBV	53 (88)	2 (3)	3 (5)	2 (3)
HCV	26 (43)	4 (7)	18 (30)	12 (20)
Gonorrhoea/ Chlamydia	19 (32)	8 (13)	18 (30)	15 (25)
Trichomonas	18 (30)	8 (13)	18 (30)	16 (25)

Epidemiology and General Knowledge

All GPs answered that the commonest age groups for chlamydia were either 15-19 and 20-24 years, but only 29% of respondents correctly identified the younger age group as having the highest notification rates.

Only 12% of respondents were unaware that HSV can be transmitted in the absence of symptoms and all GPs were aware that chlamydia can be asymptomatic. However, 31% of GPs were unaware that gonorrhoea and 29% that HSV could be present without symptoms.

Though most GP's (90%) knew that treatment of primary genital herpes infection with anti viral drugs shortens the time to healing, 53% incorrectly responded that use of these drugs in primary infection reduces the risk of subsequent recurrent episodes.

Discussion

These results are a presentation of only some of the raw data, with further analysis of the data still to be performed. This discussion will therefore focus as much on the process of this survey as the limited information presented. These findings were first presented at the 2000 CDC Conference in Katherine.

A number of issues arose in the development of the survey and subsequent analysis of its findings. For instance, whether to use a longer, more comprehensive questionnaire with the risk of few GPs participating, or a shorter, less comprehensive one, with likelihood of a better response rate. The suboptimal response rate may have reflected that the final questionnaire was too long for most GPs to readily complete, even with the incentive of CME points.

Free text responses to the clinical scenario questions were deliberately chosen to avoid the provision of a list of options with tick boxes and the bias that may inevitably result from prompting. However, as expected, problems arose in using free text, including the potential misclassification of responses like chlamydia and NSU, the inability to define the exact type of test (PCR or endourethral swab) and interpretation of poor handwriting.

A mail out questionnaire was chosen due to restraints of cost and time. Other possible means of collecting the data include telephone interviews, practice visits and focus groups. These may have yielded more accurate and comprehensive data but were not considered practical with our limited resources.

The limited survey findings presented are mostly self explanatory. However, a number of points warrant highlighting. Though GPs considered appropriate diagnoses in clinical scenarios 1 and 2, they were less comprehensive in ordering relevant tests to support them. In scenario 3, the most important finding was whether GPs considered the possibility of PID. This diagnosis was made by 66% of GPs, and 80% of GPs requested a chlamydia PCR in this situation, indicating a reasonably high degree of suspicion. Nonetheless, with many episodes of PID subclinical, this illustrates that cases are still likely to be missed.

The NT is in an almost unique situation in Australia and overseas in remaining relatively free from penicillin resistant gonorrhoea.[9] This has allowed NT practitioners to continue to prescribe amoxycillin/probenicid for treatment of locally acquired genital gonorrhoea. However, with a recent outbreak of penicillinase producing *Neisseria gonorrhoea* (PPNG) occurring in a neighbouring area,[10] and PCR testing becoming the diagnostic test of choice, practitioners in the NT need to maintain good surveillance by continuing to culture genital tract specimens. GPs performed well in this regard. For example, in

scenario 2, 83% of GPs requested urethral discharge culture and of those 17% that did not, half requested a urine culture.

However, respondents performed less well with regards to choice of antibiotics. As stated, treatment was often inappropriate for overseas acquired gonorrhoea (requiring ciprofloxacin or ceftriaxone), likely to be a result of our unique prescribing habits in the NT. Also, in many cases, the treatment did not constitute adequate syndromic management by failing to cover *Chlamydia trachomatis.* Despite differences in the typical presentations of gonococcal urethritis (GU) and non-gonococcal urethritis, it is impossible to make an absolute distinction on clinical grounds and presumptive treatment should cover both. Moreover, co-infection is common, with many studies showing rates of isolation of *C. trachomatis* from the urethras of men with GU to be about 15-25%.[11]

There now exists a legal precedent[12] for medical practitioners to offer testing for other STDs in the presence of a probable or confirmed STD. A proxy measure of whether GPs are aware of potential co-infection with two or more STDs is the rate of HIV serology testing in each of the scenarios. HIV serology was no ordered by 30-36% of GPs in the presence of urethritis or genital ulcer disease. However, this is potentially biased by the three month window period for HIV serology ie. GPs may not order an HIV test after recent infection with another STD but request one three months later, and complicated by issues of consent and confidentiality.

Conclusions

The findings of this study, though limited by a suboptimal response rate, are important for a number of reasons. Feedback to the clinical scenario, epidemiology and general knowledge questions, in the form of "Best Practice" answers,[13] were sent to all participating GPs upon completion of the survey. Such feedback should allow the identification of any individual deficiencies and specific areas of need in the area of STDs.

The survey found a number of areas where STD management could be improved, including comprehensive STD testing, screening for antenates, syndromic treatment and awareness of local epidemiology. These findings will help direct the content and development of future education programs for GPs, GP registrars and undergraduates, including a "Short Course in Sexual Health", that 95% of GP's responded they would be interested in attending. There also exists the option for GPs to conduct a clinical audit on their practice in the area of sexual health as a result of this process.

It is hoped that a consequence of this questionnaire will be improved GP knowledge, awareness and practice in relation to STDs. In practical terms this may be reflected in increased opportunistic screening, better diagnosis and treatment and more comprehensive follow-up for patients with STDs in the NT.

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Appendix

Scenario 1
A 28 year old woman presents to you with a five day history of a genital "sore". On examination, she has a large superficial labial ulcer about 8mm in size which is red and tender. She also has tender inguinal lymphadenopathy.

a. What is the most likely diagnosis in this patient?
b. List other possible causes of genital ulceration.
c. In investigating this woman, what specimens would you collect and what would you test them for? Please be specific eg. MSU for MCS
d. Would you offer this patient presumptive treatment?
e. If yes, what treatment would you give?

Scenario 2
A 33 year old man presents to you with a three day history of a urethral discharge and dysuria. He recently returned from a holiday to Bali where he had an episode of unprotected sex about a week previously. The discharge is profuse and purulent.

a. What is the most likely diagnosis in this patient?
b. List other possible causes of urethral discharge.
c. In investigating this man, what specimens would you collect and what would you test them for? Please be specific eg. MSU for MCS
d. Would you offer this patient presumptive treatment?
e. If yes, what treatment would you give?

Scenario 3
An 18 year old woman presents to you with a five day history of dysuria and pelvic pain. She denies a vaginal discharge though states sex has been painful on the last couple of occasions.

a. What is the most likely clinical diagnosis in this patient?
b. In investigating this woman, what specimens would you collect and what would you test them for? Please be specific eg. MSU for MCS
c. Would you offer this woman presumptive treatment?

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Factors affecting hepatitis A vaccination uptake among Childcare workers in the Northern Territory

Nan Miller and Sue Reid, CDC, Darwin

Introduction

The National Health and Medical Research Council of Australia recommend that all childcare workers are vaccinated against hepatitis A.[1] In August 1994, Territory Health Services (THS) initiated a hepatitis A vaccination program for high-risk occupational groups, including childcare workers. The vaccine has been available, at the government cost, to childcare workers through THS health centres since the program was introduced. A free consultation and blood test to determine if worker is already immune to hepatitis A precedes vaccination. Recommendation and availability of the vaccine was widely advertised in the centres at the onset of the program. This has been reinforced in regular periodic CDC disease control training sessions in the centres.

Twenty-six cases of hepatitis A were notified to the Centre for Disease Control (CDC) from 1 July to 30 September 1999. This was a six-fold increase compared to the same period for 1998. The majority of cases involved young children in childcare, their parents and childcare workers.

With most of the cases being linked to one child care centre. During the outbreak investigation it was apparent that hepatitis A vaccine uptake among childcare workers in the affected centres was poor.

We conducted a survey of Northern Territory (NT) childcare centre licensees' and childcare workers to assess awareness of hepatitis A preventive strategies (ie vaccination) and to identify barriers to vaccine uptake.

Methods

We developed 2 questionnaires. One for the licensee/manager of a childcare facility canvassing 1) the Centre's policy/operating plan on immunisation, 2) hepatitis A vaccination was a recommendation or a requirement, and 3) if the Centre paid for the vaccine. The second was directed at child care workers and included questions on:

- time in childcare;
- history of hepatitis A infection or vaccination;
- awareness of the recommendation for hepatitis A vaccination in childcare workers;
- reasons for not getting vaccinated (ie cost, time, unaware of risk, not enough information or other) including the primary reason for not being vaccinated.

We contacted all licensees by phone or mail to explain the purpose of the surveys and to elicit their support. The brief, self-administered questionnaires for the 2 groups were sent to 44 licensed child-care centres and the responses were collated.

Results

Licensee survey

The response rate to the licensee survey was 86% (n=38). One of the respondents was the licensee for 2 centres. None of the licensees' centres have hepatitis A vaccination as a requirement for employment. Six (16%) of responding licensees indicated that immunisation is included in the operating plan for their centre and all 6 recommend and would pay for hepatitis A vaccination for their workers. An additional 10 (27%) stated that they recommend hepatitis A vaccination to their workers but would not pay for the vaccine and 3 (8%) did not recommend hepatitis A vaccination but indicated that they would pay for the vaccine if requested by a worker. The remaining 19 (50%) did not have an immunisation policy, did not recommend hepatitis A vaccination to their workers and did not pay for the vaccine. Although comments were not elicited, 2 of the licensee respondents indicated they were unaware of the risk and one stated that staff are required to update and take responsibility for their own immunisations.

Childcare workers

The 44 childcare centres had a combined capacity of 1,988 children with staffing levels at approximately a 1:4 ratio (452). However during the survey the child population was low and staffing levels were reduced to 360 with some being relief workers. Of the staff working in the centres, 312 (87%) responded to the survey. Some of the staff (24%) were protected against hepatitis A infection with 5% (17) having had hepatitis A infection in the past and 19% (59) were vaccinated. Twelve of the 59 vaccinated staff did not know that hepatitis A vaccination was recommended for childcare workers but were vaccinated for other reasons (eg travel).

Although hepatitis A vaccination had been recommended for NT childcare workers since 1994, 44% (136) were not aware of the recommendation. Workers who were not aware of the recommendation were significantly less likely to be vaccinated (12/136 (9%) vs 47/176 (27%), p <0.0001). Awareness was related to time working in childcare. Table 1 shows the relationship between the years in childcare and awareness of the vaccination recommendation.

Table 1 Relationship of years in childcare and awareness of hepatitis A vaccination recommendation

Yrs in childcare	Hepatitis A vaccination awareness	
	Yes	No
	No. (%)	No. (%)
<= 1 year	23 (32)	48 (65)
>1 & <= 5 years	67 (59)	46 (41)
>5 & <=10 years	52 (65)	28 (35)
>10 & <=15 years	22 (76)	7 (24)
> 15 years	12 (63)	7 (37)
Total	**176 (56)**	**136 (44)**

Staff with less than one year in childcare represented 23% of the workers and had the lowest level of awareness. Many of these were relief staff or very new staff (eg less than 1 month). Vaccination recommendation awareness increased steadily after 1 year to 76% in the >10 and <=15 year group. Only a small number (7%) of the workers had been in childcare for more than 15 years.

Vaccine cost was the primary reason (46%) given by the staff that were aware of the recommendation but not vaccinated (n=126). Other reasons given included; lack of time 27%; not enough information 16%, and not aware of risk 11%.

The first hepatitis A vaccine licensed in Australia did not become available until July 1993 yet 10 of the vaccinated staff gave the date of vaccination before 1993. They may be confusing hepatitis A vaccination with other immunisations or hepatitis A immunoglobulin. The latter was frequently used as pre-exposure prophylaxis for travellers. Another 7 (12%) of the vaccinated staff were vaccinated in 1999 during this outbreak when awareness was heightened by the investigation and preventive information.

Discussion

The lack of awareness, a policy and direction within the childcare centres are areas of concern. When THS launched the hepatitis A vaccination program for 'at risk' occupational groups in September 1994 it was advertised and promoted to childcare centre licensees, managers and staff. Developing and promoting a policy and/or recommendation for vaccination in childcare centres may not have occurred due to budget constraints. Although pre vaccination testing and vaccine administration has been cost neutral for the individual or centre, the vaccine has not. Thus the worker or the employing centre are required to meet the cost of the vaccine ($37-$47/ dose x 2 doses). Since funding to childcare centres is limited the additional expense would be incurred by employers or passed on to parents, neither option being very satisfactory.

The lack of awareness to the vaccination recommendation indicated that workers are not receiving adequate information. Although there was advertising and promotion during the early months of the program it is possible it has not been well maintained over the life of the program or picked up and incorporated into childcare core business. Most of the written information is directed to the centre managers and may not always filter down to all the workers. The relative high turnover of staff in childcare, reflected in the 'years in childcare' would also effect the information flow. A busy childcare centre may find it difficult to conduct updates, training or reading of written information. This lack of time was given by many as the reason for not being vaccinated.

During this outbreak CDC was visiting and communicating by phone or letter regularly with childcare centres. Awareness of the risk and the need for vaccination went up and 7 of the staff in the most affected centre made time to be vaccinated. This suggests that regular training regarding the risk of hepatitis A and need for vaccination does make a difference.

Recommendations

1) That an immunisation policy be incorporated in all childcare facilities with childcare workers needing to acknowledge (by signature) the various risks posed by vaccine preventable diseases, including hepatitis A.
2) Lobby for funding at a national or local level to meet the cost of vaccines for childcare workers.
3) Hepatitis A awareness material for childcare workers be developed, made available and promoted in childcare centres.

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Hepatitis A Outbreak in Darwin August-December 2000

David Peacock, Head of Surveillance, CDC Darwin

Introduction

Hepatitis A is a well recognised cause of morbidity in Australia[1,2] and the infection is common in many Aboriginal communities.[3,4] The disease is notifiable throughout Australia with the Northern Territory (NT) having the highest notification rate of any jurisdiction.[2] Outbreaks of hepatitis A do occur, with a recent New South Wales outbreak from eating contaminated oysters resulting in almost 500 cases.[5] Other outbreaks[6,7,8,9] have involved illicit drug users, restaurants, childcare centres and schools.

Clinically, this viral disease is indistinguishable from other viral hepatitides presenting with fever, malaise, anorexia, abdominal pains and jaundice. Symptoms usually remit within a couple of weeks but can, occasionally, persist for months. The incubation period is usually about 30 days (range 15-59 days) and cases are infectious for the latter half of the incubation period and up to one week after the onset of jaundice. Transmission is usually faecal-orally and infection normally gives life-long immunity. Although, the case-fatality rate is low and long-term sequelae are rare both the severity of disease and mortality increase with age. In children, infections can be mild or asymptomatic. By contrast, adults can suffer severe disease.

Because of this increased risk of severe disease, particularly in adults, normal human immunoglobulin (NHIG) is offered to all close contacts of a confirmed case. To be confirmed, a case has to have symptoms of hepatitis A plus *either* positive IgM serology *or* to have had contact with a confirmed case during the infective period. A vaccine is available but is not part of the routine schedule except for high risk groups and its use is recommended for travellers to countries with endemic disease.[10,11,12]

This paper briefly summarises hepatitis A notifications over the last 10 years and a recent outbreak in Darwin.

Hepatitis A in the NT, 1991-2000

In the 10 years 1991-2001, there were 812 cases of hepatitis A notified in the NT. Notification rates by year are given in Figure 1. The rate in 1992 was particularly high with 81 dispersed cases in the Alice Springs district and an outbreak in Palmerston.[13]

Figure 1 Notification rates for hepatitis A in the NT

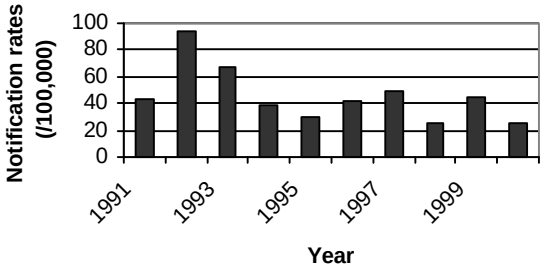


Table 1 gives the distribution of cases by age group; the mean and median ages are 21.2 and 23.0 years, respectively. This distribution should be interpreted recognising that mild childhood cases are unlikely to be notified.

Table 1 Notification counts and rates for hepatitis A by age group (1991-2000 inclusive)

Age Group (yrs)	Number	Percentage	Rate (/100,000)
0 to 4	141	17.7	81.0
5 to 9	118	14.8	71.8
10 to 14	48	6.0	32.2
15 to 19	47	5.9	33.8
20 to 24	67	8.4	39.8
25 to 44	329	41.4	50.0
45 to 64	44	5.5	15.0
Over 64	1	0.1	1.8
Total	795	100.0	44.1

There were 396 cases in females (46.4/100,000) and 415 in men (43.8/100,000). It is noteworthy that the rate for females is higher than that for males; in some places the rates for males have been increasing, mainly amongst homosexual men.[14]

Twenty-eight per cent of cases were Aboriginal (30.8/100,000) and the remainder non-Aboriginal (38.6/100,000). It is unlikely, however, that notifications reflect the true burden of disease especially amongst Aboriginal children.[15]

The distribution of cases by Health District is given in Table 2.

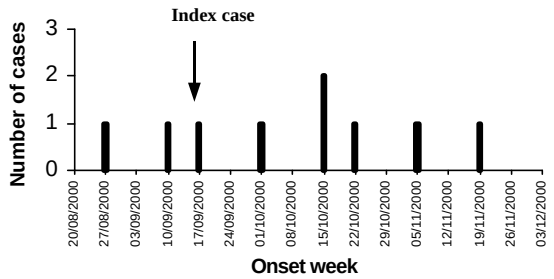
Table 2 Notification counts and rates for hepatitis A by health district (1991-2000 inclusive)

District	No.	%	Rate (/100,000)
Alice Springs	205	25.2	56.5
Barkly	36	4.4	54.6
Darwin	407	50.1	37.8
East Arnhem	38	4.7	29.4
Katherine	126	15.5	74.7
Total	812	100.0	

Darwin outbreak 2000

This small outbreak involved 9 laboratory confirmed cases and 5 other epidemiologically-linked cases. Despite its small size, the outbreak illustrates some of the difficulties inherent in controlling hepatitis A outbreaks.

Figure 2 Epidemic curve for the outbreak based on estimated date of onset



All notified cases were female and 6 were adults. All were non-Aboriginal. The 'index' case, "A", was notified to the Centre for Disease Control (CDC) on 21 August 2000 following a positive hepatitis A IgM result; symptom onset was 10 days earlier. Her 4 year old son had recently had symptoms of viral hepatitis. "A" declined to give details of outside contacts and no family members accepted Normal Human Immunoglobulin (NHIG) prophylaxis as they felt that they may already be immune.

Three weeks later, a member of the public rang the CDC to say that an associate, "B", was unwell and there were rumours of hepatitis A in the neighbourhood. Subsequently, on 26 September, "B" and 2 young girls had laboratory confirmation of hepatitis A. At follow-up, "B" revealed that her children, aged 2 and 7 years, had had symptoms consistent with hepatitis A but neither had visited their doctor. "B" would not provide contact details but it seemed likely that her children played with the children of the index case, "A", and, possibly, with the other 2 recent female cases.

Education and advice about hepatitis A were provided to all cases or their caregivers and to the local primary school. Local health care providers were also alerted to the presence of hepatitis A in the community. Over the next 3 weeks, 5 more cases were laboratory confirmed. All of the cases were in the same or adjacent suburbs and there was a putative epidemiological link, children, between them all. Only one contact accepted NHIG prophylaxis. As a precaution, hepatitis A information sheets were provided to 2 local childcare centres.

Discussion

The outbreak is instructive because of the indolent way that the disease spreads and difficulties in contact tracing. The relatively long incubation period (15 to 50 days) and the presence of asymptomatic carriers makes the control of 'dispersed' hepatitis A outbreaks potentially very difficult.

Additionally, contact tracing was difficult. Most cases were reluctant to provide personal details of contacts without the latter's knowledge or consent. Effective surveillance is crucially dependent on good information and, in an out-

break, the collection of this information requires the willing collaboration of the public. Collecting details of case contacts raises the issue of the individual right to privacy versus the public good. Further, public understanding of the necessity of effective contact tracing may be compromised by the spasmodic way in which hepatitis A can spread. As a result, hepatitis A outbreaks may neither grab public attention nor be perceived as important.

Control of disease is made a little more difficult because, for safety reasons, NHIG is only offered to contacts of cases that are laboratory confirmed; not to the contacts of epidemiologically confirmed cases. Consequently, some vulnerable contacts may miss out on prophylaxis.

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Firework related injuries during Territory Day Celebrations 2001

Justine Glover, Chronic Disease and Injury Prevention Project Officer, CDC, Darwin
Didier Palmer Director RDH Emergency Department

Introduction

This report follows on from the last three years of active surveillance of firework injuries conducted by the Darwin Centre for Disease Control. Surveillance methods have been detailed previously.[1]

Background

Since 1998 there has been a significant decline in the number of reported cases and the number of children injured from fireworks. The decline in cases coincides with the implementation of the Department of Industries and Business (DIB) – Work Health strategy to promote safer firework celebration in the Northern Territory. The DIB firework strategy includes:

1. coordination of a joint publicity campaign with Northern Territory Police, Fire & Emergency Services and Territory Health Services (THS) focusing on high-risk groups;
2. development and enforcement of strict na-

tional standards to ensure quality and safety of fireworks sold to the public, and
3. education/support for local business to support safe practice.

Results

In 2001 there were 9 firework injuries reported in the Darwin & Palmerston area, 3 more than last year. There were no fatalities. None were identified as Aboriginal or Torres Strait Islander. One burn case required admission and 2 burn injuries occurred in toddlers under 2 years of age. All 6 burn injuries were female and 3 males had ear or eye injuries. Four of the injuries were to bystanders. All the male injuries occurred in the 16 to 30 age group. The majority of injuries were preventable using simple safety rules.

Table 1 Firework related injuries in Darwin 2001

Age Group	< 5 years		5 to 15 years		16 to 30 years		31 to 45 years		> 45 years		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Moderate Burn	0	1	0	1	0	1	0	1	0	1	0	5
Severe Burn	0	1	0	0	0	0	0	0	0	0	0	1
Moderate Ear Injury	0	0	0	0	2	0	0	0	0	0	2	0
Moderate Eye Injury	0	0	0	0	1	0	0	0	0	0	1	0
Total	0	2	0	1	3	1	0	1	0	1	3	6

Note on severity rating:

Severe	admitted to hospital (IV antibiotics, analgesia, dressing)
Moderate	requiring 2 or more reviews by a health practitioner
Mild	requiring only one visit to a health practitioner

Figure 1 Number of firework related cases 1998-2001 in the Darwin & Palmerston area by age group

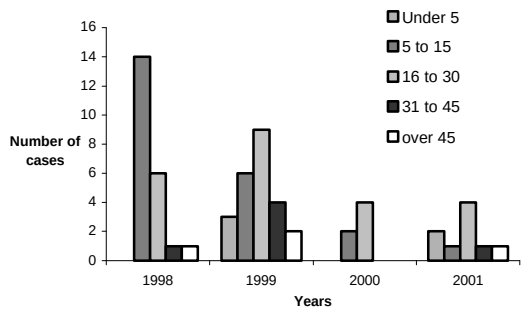
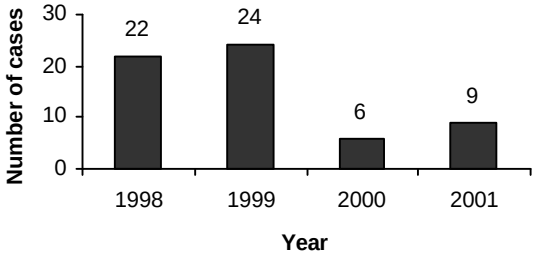


Figure 2 Total number of firework related injuries Darwin 1998-2001



Discussion

All injuries occurred at private displays. The public was encouraged through the media not to take fireworks to public displays and to read instructions carefully and to only buy from licensed retailers.

Injuries in 2001 included:

- A women running from a thrown firework was burnt through her clothing.
- A teenager was burnt when a cracker set fire to her shirt.
- A woman was burnt when a firecracker from another group misfired and hit her.
- Two separate incidences of toddlers being burnt by hand held sparklers.
- A man sustained damage to his eardrum when a firework from another group exploded adjacent to his ear.

All these injuries were potentially serious and all bar one were preventable (a suspected faulty unit). Reports stated that people at public displays were generally well behaved, however, there were reports of people taking dangerous risks such as groups letting off fireworks in crowded areas, fireworks being thrown from a car and one at a petrol station.

Incidents reported in the Northern Territory News, July 3, 2001 included:

- Fire and rescue division fought 66 grass fires over a 24-hour period.
- Police attended 50 firecracker-related incidents in Darwin, 10 in Alice Springs and one in Katherine.
- More than 50 reports of dogs lost and found were received by the Darwin RSPCA.

Recommendations

1. Further assessments of injuries are warranted over the next 5 years to monitor the trend.
2. THS to continue involvement with coordinated safety campaign.
3. In 2002 focus media campaign on safe handling of fire works, parental supervision and encouraging the public not to take fireworks to public displays.
4. In the 2002 community survey to include consent for follow up interview. This will help Work Health investigate possible illegal sales of banned and or faulty firework items.

Acknowledgement

Special thanks to Dr Jackie Mein who first implemented the community surveillance of firework injuries in 1998 for developing an excellent proforma that allows her successors to conduct the survey with ease.

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Breast Cancer Month and Pink Ribbon Day

Breast Cancer Fast Facts

- Breast cancer is the most common form of cancer affecting women in Australia
- One in 11 Australian women develop breast cancer before the age of 75
- About 10 per cent of breast cancers occur in women with a family history
- Although unusual, men can develop breast cancer – the disease has a greater impact on their female partners
- About 10,000 Australian women are diagnosed with breast cancer each year
- One in 24 female deaths are due to breast cancer
- Breast cancer is the leading cause of cancer death in Australian women
- While the incidence of the disease is increasing, the survival rate is improving.

Background Information

Breast Cancer is the major cause of cancer death in Australian women accounting for 10,000 new cases of breast cancer and 2,600 deaths each year. Early detection is the best method for reducing deaths from breast cancer.

Fifteen per cent of all breast cancers are advanced at diagnosis. Women whose cancer is diagnosed when it is contained in the breast, have a 90% chance of surviving five years compared with 20% five-year survival when the cancer is has spread at diagnosis.

Breast Cancer Month and Pink Ribbon Day

October is recognised as Breast Cancer Month, where all breast cancer organisations team together to raise awareness and funds for research into the disease. Throughout the month of October, activities and information will be available highlighting the importance of research. The fourth Monday of October is dedicated to raising funds for breast cancer research. This day is known as Pink Ribbon Day.

For further information contact the National Breast Cancer Foundation on 1800 000 118 or visit the web site at www.nbcc.org.au

Reference

National Breast Cancer Foundation Media Release

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Achievements in cervical cancer screening practice in the NT

Beth Amega, Policy/Promotions Officer, Women's Cancer Prevention Program

Cervical cancer in the NT

According to the THS Health and Welfare of Territorians report[1], deaths due to cervical cancer in the Northern Territory (NT) are 9 times higher in Aboriginal NT women than the national rate and 8 times higher than non-Indigenous NT women. The incidence rate is 3 times higher in NT Aboriginal than the national rate and more than double the non-Aboriginal NT rate.

There is evidence that 2 yearly Pap smears can reduce the incidence of cervical cancer by up to 90%. Since the commencement of the National Program, cervical cancer mortality has decreased by 40% in the period between 1986 and 1998.[2] The target group has been women aged between 20 and 69 years who have ever had sex and not had a hysterectomy.

Cervical cancer screening program

The organised approach to screening for cervical cancer in the NT began with the acceptance of the National Cervical Cancer Screening policy in 1991.
This resulted in the commencement of the Women's Cancer Prevention Program and in the establishment of the NT Cervical Cytology Register in March 1996.

A feature of the NT Program is the Well Women's Screening Program which funds Women's Health Educators (WHE) and training programs to increase the number of competent practitioners in rural and remote districts. The Program's goal is to continue to reduce morbidity and mortality caused through cervical cancer in NT women. It does this using strategies aimed at increasing the proportion of all NT women who have been screened in the previous two years and the proportion of women aged between 20-69 who are resident in remote communities who have been screened in the previous 2 years.

Recruitment strategies and outcomes Achievements

Strategy 1: NT Cervical Cytology Register, commonly known as the Pap Smear Register (PSR)
Outcome: This centralised and confidential database of women's cervical smears makes it possible to send reminders to women and their practitioners when follow up cervical care is overdue and collect data for health promotion and research purposes.

Strategy 2: Well Women's Screening Program (WWS)
Outcome: The encouragement of health practitioners to conduct holistic well women's checks to screen for chronic diseases such as diabetes, hypertension, breast and cervical cancer.

Strategy 3: Electoral Roll Letters
Outcome: Letters to be sent to woman not currently on the NT PSR informing them of the need and benefits of having pap smears. An application is being made to the Electoral Commission for further information so this can be commenced, with initial focus on areas with the lowest cervical screening rates.

Strategy 4: Women's Health Educators (WHE)
Outcome: WHE visit and train health practitioners in rural and remote communities increasing the awareness of need for well women's screening and increasing the number of health practitioners competent in screening skills.

Strategy 5: Bilingual Health Educators
Outcome: Training of peer community members on need for well women screening, focussing on women from culturally and linguistically diverse (CALD) backgrounds. This has resulted in increasing numbers of CALD women taking part in cancer screening activities.

Strategy 6: Other Health Promotion activities
Outcome: Women's Health Day, Indigenous Women's Health Expo, Pap Smear Awareness Month in September, 2001

Achievements

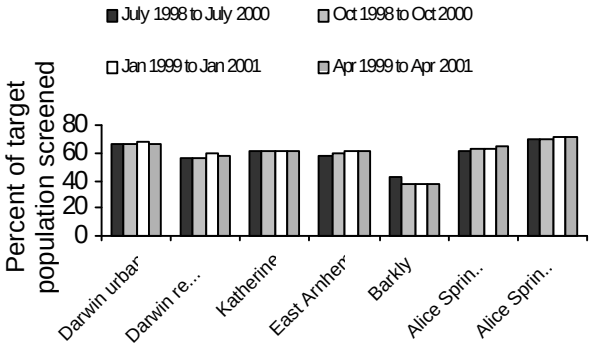
The success of the program is indicated by an analysis of the participation in screening rates in the various districts over a two-year period.
The following graph (Figure 1) shows the screening participation rate trend according to districts. The number of women being screened in the NT has grown slowly since the establishment of the Screening Program, keeping pace with population growth and so maintaining a stable participation rate. The current rate of participation shows an increase compared with the same quarter two years ago. The NT Screening rate overall is 64.8% in comparison with the National Screening rate of 64%.

The screening rate as recorded by the PSR in the Barkly region has been under evaluation for the last 2 years. Two formal evaluations have been carried out with their recommendations acted upon. Increased resources and various strategies have been put in place in the district with little success to date. Barkly is involved in the Commonwealth funded fly-in female GP program however screening rates have shown no increase with this input. A recent 4 week project in the district has produced the first reports of a higher than average rate of women opting off the register. This finding will now be investigated. There are plans also to access the NT electoral roll to evaluate the PSR data results.

Assumed limitations to Participation Indicators

Since women are given the opportunity to 'opt off' the PSR, this results in an incomplete picture of screening for cervical cancer, as only those on the PSR can be used in analysis. Nationally it is accepted approximately 1-2%[3] of women will choose to opt off the Register. However based on feedback from clinical staff it is believed that this figure is much higher in some districts of the NT. Evaluation is needed to ascertain this percentage by districts, to ensure a more accurate participation analysis and is currently being developed. Due to high mobility between regions, population data may be inaccurate at a regional level in the NT. Indigenous status is not recorded on the PSR making it difficult to ascertain the effect of screening on reduction of cervical cancer in Aboriginal women.

Figure 1 NT Pap Smear Screening Rates for Women with a Cervix 20-69 years



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Anaemia In Aboriginal Children – Issues and Actions Workshop Miwatj Health Service, 15th June 2001

Hung The Nguyen, Miwatj Health Service, Nhulunbuy

Anaemia in Aboriginal children is an important condition. The condition has a high prevalence in Aboriginal communities and when discovered may be severe. Remote Area Nurses (RAN) and Aboriginal Health Workers (AHW) are frontline health professionals dealing with this huge problem. The problem of anaemia in Aboriginal children has not improved in many communities and may be getting worse in others. Some programs and projects have been completed or are underway, but these are few in number. The success or failure of these projects and programs are rarely reported or widely distributed. Thus, others cannot learn from other communities past experience and may be making similar mistakes in program development and implementation. Community health clinics may not even know where to start in dealing with anaemia in children. The many issues may seem overwhelming to staff who are already overworked.

Coinciding with a recently distributed discussion paper on anaemia in Aboriginal children[1] and the new Top End guidelines for the treatment of anaemia in Aboriginal children, it seemed fitting to organise a workshop for health professionals in rural and remote clinics in East Arnhem Land. It was important for the workshop to also deal with the main issues that concern remote community clinics.

There was wide participation from remote communities including Maningrida, Galiwin'ku, Numbulwar, Yirrkala and Marngarr Community Clinics. AHWs, RANs, rural and remote GPs, Gove Hospital based nurses and others participated.

Those presenting at the workshop included:

- Child Health – Barbara Paterson and Brad Palmer
- Paediatrician – David Brewster
- Menzies School of Health Research – Dorothy Mackerras
- East Arnhem Nutritionist – Jenny Freeman
- East Arnhem EHO – Mick Kinnaird
- Miwatj Health GP – Wendy Page
- Resident GP Numbulwar Community – Hung The Nguyen
- Katherine Hospital DMO– Rosalie Schutz
- Bagot Community GP – Jenny Davis

The workshop had 3 sessions.

- The first was an overview of anaemia, including its epidemiology in the wider Australian community and from the local NT data. The session discussed the HemoCue's reliability and validity in screening and diagnosis of anaemia.
- The second session dealt with relevant contributing factors to childhood anaemia and iron deficiency. It included nutritional intervention techniques, the role of intestinal parasites and environmental health's role in improving infection and infestation of various diseases in children. This session also discussed compliance issues in remote Aboriginal communities and using the venous blood examination in diagnosing iron deficiency anaemia (IDA).
- The final session allowed various groups to discuss their present or intended projects or programs. Katherine West, Bagot Community and Numbulwar Community presented.

Significant issues discussed included:

- Prevalence and trends of rates of anaemia in the general Australian population and Aboriginal communities.
- Concern over the new higher parental dose of iron in the treatment of IDA and the rationale for its use.
- Concerns regarding the variability of haemoglobin (Hb) estimations within and between operators in remote clinics.
- The role of intestinal parasites in anaemia and nutritional status and how blanket anti-helminthic administration tries to control worm rates in children in Aboriginal communities.
- The need for primary prevention and to address factors leading to anaemia and iron deficiency in children through nutritional intervention and environmental health principles.

It was apparent that we should not be concentrating on anaemia and iron deficiency anaemia alone but also on malnutrition and poor nutri-

tional status. These problems are huge and there is no simple solution. A broad-based community approach is needed. Although the group's purpose was not to make recommendations or position statements, some key actions and needs were highlighted as follows:

1. There is a continuing need for surveillance to identify and treat anaemia.
2. There is a need for prevalence studies that examine the relative contribution of parasites, diet and acute, chronic and recurrent infections and diseases on the development of anaemia.
3. The HemoCue is a reliable screening tool and in communities of high prevalence of anaemia is acceptable as a diagnostic tool.
4. HemoCue reliability is highly dependent on technique and storage of the machine; especially the cuvettes that contain the reagents.
5. New staff need background knowledge and training for the correct use of the HemoCue for Hb estimation.
6. It is apparent in some communities that the role of hookworm in IDA is in decline. Blanket anti-helminthic (albendazole) or deworming seems to reduce worm burdens in the community.
7. There needs to be a focus on treating iron deficiency and not waiting for when anaemia to be diagnosed.
8. Need to investigate the use of bush foods for IDA and nutritional deficiencies such as Zinc, Vit A, B12 and folate.
9. Local community initiatives are important as is the population health approach and these can potentially incorporate all services and members of the community. Environmental health and nutritional interventions are key areas in such initiatives.
10. There is a need to focus on antenatal nutrition and anaemia as well as ensuring premature and low birth weight babies are identified as high risk for anaemia.
11. Educational resource aids are lacking and there should be a focus on local resource development.

Anaemia and malnutrition in Aboriginal children continue to be major problems in communities. Surveillance of nutritional status and anaemia are performed in some communities. Most communities use established guidelines to aid them in treating IDA. Other activities to decrease the prevalence of anaemia and malnutrition are uncommon and when they do occur experiences are not shared widely. This workshop tried to address the relevant issues and to allow interested people, groups and communities to share their experiences.

Reference

1. Community based diagnosis and treatment of anaemia in NT Aboriginal children. Discussion paper. January 2001. Karen Edmond, Andrew White and Barbara Paterson – THS.

For further references, resources and other information presented at the workshop please direct queries to hung_the_nguyen@optusnet.com.au

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Iron Deficiency in Aboriginal Children in the Northern Territory

adapted from a report written for the Childhood Working Group of Royal Australian College of Physicians

David Brewster,Clinical Dean, NT Clinical School, and Head, Paediatric Department, Royal Darwin Hospital

Problem

Many Aboriginal Community children in the Northern Territory (NT) have iron deficiency and iron deficiency anaemia (IDA). These, in combination with wasting and microcephaly, are likely to be important contributors to the health disadvantage which Aboriginal children suffer. In addition, studies on intestinal permeability indicate iron deficiency is an important risk factor for tropical enteropathy and malabsorption, which contribute to failure to thrive in the weaning period.

'Iron Deficient' and 'Anaemic'

Out of a cohort of 408 Aboriginal children admitted to Royal Darwin Hospital (RDH) with detailed research information, 55% had microcytosis (MCV <72fl) with a blood film suggestive of iron deficiency and 35% were anaemic (haemoglobin <110g/L). The comparable figures for non-Aboriginal children were 6% and 16%, respectively. Although these data reflect a hospital bias, this appears to be much less of an issue for Aboriginal children than other children because of their extremely high hospitalisation rate. Community anaemia studies in the NT have relied on capillary haemoglobins (Hb), which may be inaccurate because of technical inadequacy and report higher rates of anaemia.

Iron Deficiency Anaemia (IDA)

The exact prevalence of IDA is uncertain among Aboriginal children from remote communities because of the high prevalence of infections. If IDA were defined as microcytosis with a haemoglobin <110g/L then about 27% of Aboriginal children have iron deficiency anaemia in hospital compared to 8.5% of non-Aboriginal children. However this undoubtedly overestimates the true prevalence since (from our study of a large Top End community) many children who are iron-replete from parenteral iron still drop their haemoglobin below 110g/L with infections (and also have persistent microcytosis). Therefore, we believe that a more accurate estimate in this population would be based upon:

1. microcytosis (MCV <72fl)
2. hypochromia-microcytosis on blood film, AND
3. haemoglobin <100g/L.

This would reduce the prevalence to 13% of Aboriginal children and 3% of non-Aboriginal children in our hospital cohort, although this could well be an underestimate of the true community prevalence. This issue is being evaluated and hopefully resolved through our paediatric research laboratory at RDH which includes the use of soluble transferrin receptor, as an investigative tool.

Diagnosis

There are particular difficulties in diagnosing IDA in Aboriginal children from remote communities in the NT. Even iron studies do not definitively resolve the issue for the following reasons.

1. We found the haemoglobin frequently drops below 110gm/L with trivial infections. Since the iron indicators and MCV, serum iron, TIBC and transferrin saturation tend to be abnormal in Aboriginal children because of the high prevalence or iron depletion, this results in a diagnosis of IDA when it is really iron deficiency with anaemia of infection. In addition, the ferritin is totally unreliable in Aboriginal children, even in community studies of apparently well children. Conventional wisdom is that a ferritin >50g/L is a definite exclusion for iron deficiency anaemia, but we have found many exceptions to this in our population.

2. Although one unpublished Perth study did not find that soluble transferrin receptor satisfactorily differentiated these two conditions in rheumatoid arthritis, all of the paediatric studies in the literature indicate that soluble transferrin receptor is a reliable diag-

nostic tool for iron deficiency anaemia as distinct from anaemia of infection. There are several different laboratory techniques and kits available for soluble transferrin receptor, and our investigations indicate that the Orion Latex test is the most appropriate for our circumstances. This diagnostic tool has not yet been used for Aboriginal patients to my knowledge.

Epidemiology

From a clinical perspective, the major risk factor for iron deficiency is an inadequate weaning diet in partially breastfed child from 4 to 24 months. This is also a major risk factor for failure to thrive. Aboriginal mothers in the NT continue breastfeeding until about 18 months, but do not introduce iron rich solids in sufficient amounts to supply iron and growth needs. It is also likely that the high burden of disease and tropical enteropathy syndrome result in greater requirements and less absorption, respectively. Cows milk does not seem to be a risk factor since its intake is very low in children of this age and the small amount added to tea is probably not a significant contributor to iron deficiency. There is a prevailing belief that drinking tea is a risk factor for poor iron absorption, but I understand that more recent iron labelled absorptive studies have not confirmed this hypothesis and the amounts taken in childhood are too small to be a contributor. However, the other important risk factor for iron deficiency is low birth weight, particularly pre-term infants.

Finally, many health workers in the Top End are convinced that hookworm and other parasites are a major contributor to iron deficiency and some studies in the literature seem to support this. However since 1993 over the last 5,324 stool microscopy results reported at RDH only 40 (0.75%) showed positive evidence of hookworm infestation and, all at relatively low levels. There has been a significant reduction in the prevalence of hookworm due to the wide use of albendazole in communities over recent years, but some pockets remain. Still, it is not a major factor in paediatric IDA.

Consequences

There is a tendency to exaggerate the importance of iron deficiency on psychomotor development. This issue has been critically reviewed recently by Sally Grantham-McGregor in *The Journal of Nutrition*, 2001 Volume 131, pages 649S–666S. Nonetheless, in the Aboriginal community context, it is likely that prolonged periods of iron deficiency in childhood combined with eg. growth retardation and microcephaly contribute to the disadvantage suffered by some Aboriginal children.

Treatment

A clinical trial from a Top End community showed that compliance with prescribed oral iron is negligible but directly observed therapy twice a week was effective and resulted in a rise in Hb similar to intramuscular (IM) iron. IM iron is in widespread use in the NT for iron deficiency anaemia in spite of its known risks of anaphylaxis. The risk is probably less than the health disadvantages of iron deficiency. I proposed a directly observed therapy program supervised by Aboriginal Health Workers in six communities as part of the National Child Nutrition Project, but none was funded by the Commonwealth.

Clearly there are 2 possible approaches to detecting the prevalence of IDA and iron deficiency in Top End Communities. One approach is medical and involves administration of supervised iron on a weekly or twice weekly basis or an IM course. This would clearly improve the situation in the short term. The other approach is a community development approach requiring behavioural change to improve the intake of iron rich solid foods during the weaning period. This would have the addition potential benefit of improving the overall nutritional status. However, interventions to change behaviour in any communities have not been very successful - or have taken generations. It seems to me that we can not afford to rely on only community development approaches of unproven efficacy, and it is incumbent upon us to ensure an adequate iron intake for Aboriginal children while community development progresses.

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A Territory Health Service mosquito survey of Dili, East Timor, and public health implications.

Peter Whelan, Medical Entomology Branch, Darwin

There has been no documented mosquito surveys carried out in East Timor since the work of Portuguese workers in the 1960's. The last was a Territory Health Service (THS) Medical Entomology Branch survey of Dili in September 1991 to assist the Indonesian government in controlling general mosquito problems of Dili.

Following the referendum and subsequent humanitarian crisis in East Timor in September 1999, there was widespread destruction of houses and breakdown of all public health services. THS quickly appreciated the public health risks from mosquito borne diseases and conducted briefings with the World Health Organisation (WHO) and defence forces on the potential risks based on the results of the 1991 mosquito survey. It was realised that the information from the 1991 survey, while of great assistance, was in urgent need of reassessment to evaluate the wet season mosquito borne disease potential. Of particular importance was an evaluation of the potential for dengue and malaria outbreaks.

In early October 1999 WHO requested THS to conduct a medical entomological survey of Dili. Initial mosquito trapping was carried out in mid October by sending equipment with a visiting WHO staff member from Geneva who received basic training in Darwin on setting the traps. The trapped mosquitoes were sent back to Darwin for identification and assessment. The results revealed that there were few vector mosquitoes and a comprehensive survey was planned to coincide with first rains and the presence of a THS contact with an international aid agency in Timor. The aim of the survey was to determine the presence of pest and disease vectors in Dili, to determine their actual and potential breeding sites, and to provide advice on mosquito control and the reduction of mosquito borne disease.

The senior medical entomologist from THS carried out the survey in December 1999 with assistance from an environmental health officer working with Oxfam International. A house mosquito breeding container survey, a general mosquito larval survey and various mosquito adult collections were made.

The house survey involved an inspection of 20 houses in Balide and Kaikoli for water holding containers. A sample of mosquito larvae was collected from those containers with larvae. General larval surveys were carried out both in domestic situations and in a range of other habitats including suburban swamp areas, beachside coastal areas, storm drains, wells, rice paddy fields, and roadside pools. (see figure 1) Adult trapping was carried out using dry ice baited EVS traps. Three trap sites were selected, including one in a swamp area in central Dili, one in an urban area near the Santana River on the east side of Dili, and one in a semi rural area on the southern outskirts of Dili in the foothills near Balidae adjacent to a forest and a small stream. Opportunistic biting collections were carried out at sites of reported mosquito pest problems. Collections were made just after sundown in sheltered positions away from concentrations of people and lights. The mosquitoes were collected with the aid of a small aspirator as the mosquitoes were about to bite exposed legs.

A detailed report was prepared for the United Nations. Fifteen mosquito species were recovered, including the vectors of malaria, dengue and Japanese encephalitis. Various mosquito control options were discussed, together with strategies for reducing mosquito borne disease. The potential for importations of exotic mosquitoes and mosquito borne disease into Australia was outlined. The conclusions from the survey are outlined briefly below.

Dengue

Aedes aegypti, the vector of dengue, breeds principally in rain filled artificial containers (rubbish such as drums and tyres) and containers (200 litre drums and rainwater tanks) used to store potable water.

The house container survey results indicated a considerable amount of breeding sites of *Ae. aegypti* in residential areas. The following relationships have been suggested between the calculated indices of containers with *Ae. aegypti* and the transmission of dengue (WHO 1972).

Table 1 Suggested relationships between calculated indices of containers with *Ae. Aegypti* and the transmission of dengue

	House Index*	Container Index*	Breteau*
House survey Dili 1999	55	29	135
Transmission unlikely	1-3	1-2	1-4
Significant Risk	4-7	3-5	5-9
	8-17	6-9	5-9
	18-28	10-14	20-30
	29-37	15-20	31-49
High Risk	38 and over	20 and over	50 and over

* House index is the percentage of houses positive for *Ae aegypti* breeding.
Container index is the percnetage of water holding containers positive for *Ae aegypti* breeding.
Breteau index is the number of water holding containers positive with *Ae aegypti* larvae per 100 houses.

The House index of 55, container index of 29 and Breteau index of 135 placed Dili in the high-risk category for dengue transmission. The results of the residential inspections during the general larval survey supported the results of the house container survey, and confirmed that *Ae. aegypti* was present in high numbers in close proximity to large concentrations of people, and posed a very high risk for arbovirus transmission.

The mandi (a cubic upright concrete tank open at the top continuously holding water for splash bathing, flushing and other domestics uses. They are usually in the bathroom or toilet areas of houses and often have a tap attached for adding water.) breeding sites for *Ae. aegypti* at the Care International headquarters and at Oxfam headquarters provided ideal mosquito breeding and feeding sites, and indicated that conditions for transmission of dengue in these situations were ideal.

The problems

- There were very high numbers of *Ae. aegypti* in Dili. *Aedes albopictus*, an alternative vector of dengue was also present.
- There is a very high risk of a dengue outbreak in Dili and probably other areas in the country.
- The principal breeding places are mandies and 200 litre drums used for the storage of potable water.

The possible solutions

- The reduction of risk for dengue requires source reduction, personal protection, education about mosquito breeding sites, and control of domestic breeding sites.
- Control in mandies by local fish is a real and immediate possibility, as the fish are hardy, readily available, and capable of mosquito control.
- Simple reduction measures could include sealing water tanks, and installing drum tops and taps on drums holding potable water.
- Application of the residual insecticide deltamethrin to walls inside houses and outside near mandies could reduce adult mosquitoes.
- Troops and aid workers require impregnated clothing, nets, and repellents.
- There is a high risk of importation of dengue vectors into Australia, via machinery and equipment via cargo and defence vessels returning to Australia.
- Australian aid could be used to reduce vectors in ports in Timor as a training exercise and ensure a reduced risk for Australia.

Malaria

The problems

- There were limited *Anopheles* mosquito breeding sites in urban Dili but there are productive *An. subpictus* and *An. sundaicus* breeding sites present on the outskirts of Dili in coastal areas and in rural and semi rural areas.
- Potential *Anopheles* breeding sites occur in rice paddies on the outskirts of Dili.
- Malaria transmission was a relatively low probability in most urban areas of Dili but higher in semi urban or urban areas adjacent to coastal mosquito breeding sites.

The possible solutions

- Malaria control requires source reduction, personal protection and education.
- Larval control opportunities by engineering means exist in coastal areas with the use of drainage and tide valves in drainage pipes to the sea.
- Larval control opportunities exist by using fish in irrigation channels and management

of irrigation water in rice husbandry.
- Impregnated bed nets are the best immediate measure to interrupt malaria transmission.
- Australian aid could be used to determine malaria transmission locations and the relevant entomological factors for transmission in Timor with an aim to interrupting transmission.

Japanese encephalitis

The problems
- Many Japanese encephalitis vectors are likely to be present on the outskirts of Dili.
- *Culex annulirostris, Cx. vishnui, Cx. pseudovishnui, Cx. fuscocephala, Cx. gelidus* and *Cx. tritaeniorhynchus* are vectors of JE and all are present in Dili and probably in many areas of east Timor.
- Their primary breeding sites are rice fields, rain filled depressions, and some drains.
- Most storm drains are not mosquito breeding sites due to fish predation.
- The JE potential is limited in urban Dili, but higher on the outskirts, particularly where pigs are present to act as amplifiers of the virus.
- There is a risk of infected mosquitoes being blown to Australia by monsoons or cyclones. The greatest risk areas in the NT, would be Bathurst Island and other coastal areas where there are feral pigs in close contact with residential areas.

The possible solutions
- The reduction of risk requires source reduction, personal protection and education.
- Control opportunities could include the use of fish in rice fields and water management practices.
- Personal protection by the use of bed nets can interrupt transmission.
- Reduction of pigs in urban areas, or their isolation from residential areas in rural areas can reduce the probability of transmission.
- Australia aid could reduce JE transmission in Timor by assisting with education.
- Quarantine authorities need to increase surveillance for JE incursions into the NT.

Filariasis

The problems
- Three species of filaria parasites are probably present in Timor.
- Potential vectors include *Cx. quinquefasciatus*, *An. subpictus*, and *Ma. uniformis*.
- High numbers of *Culex* and *Mansonia* mosquitoes are present in urban Dili.
- The highest *Mansonia* numbers are present in the Kaikoli locality in Dili associated associated with *Pistia (water lettuce), Eichornia (water hyacinth)* and kankung aquatic vegetation.

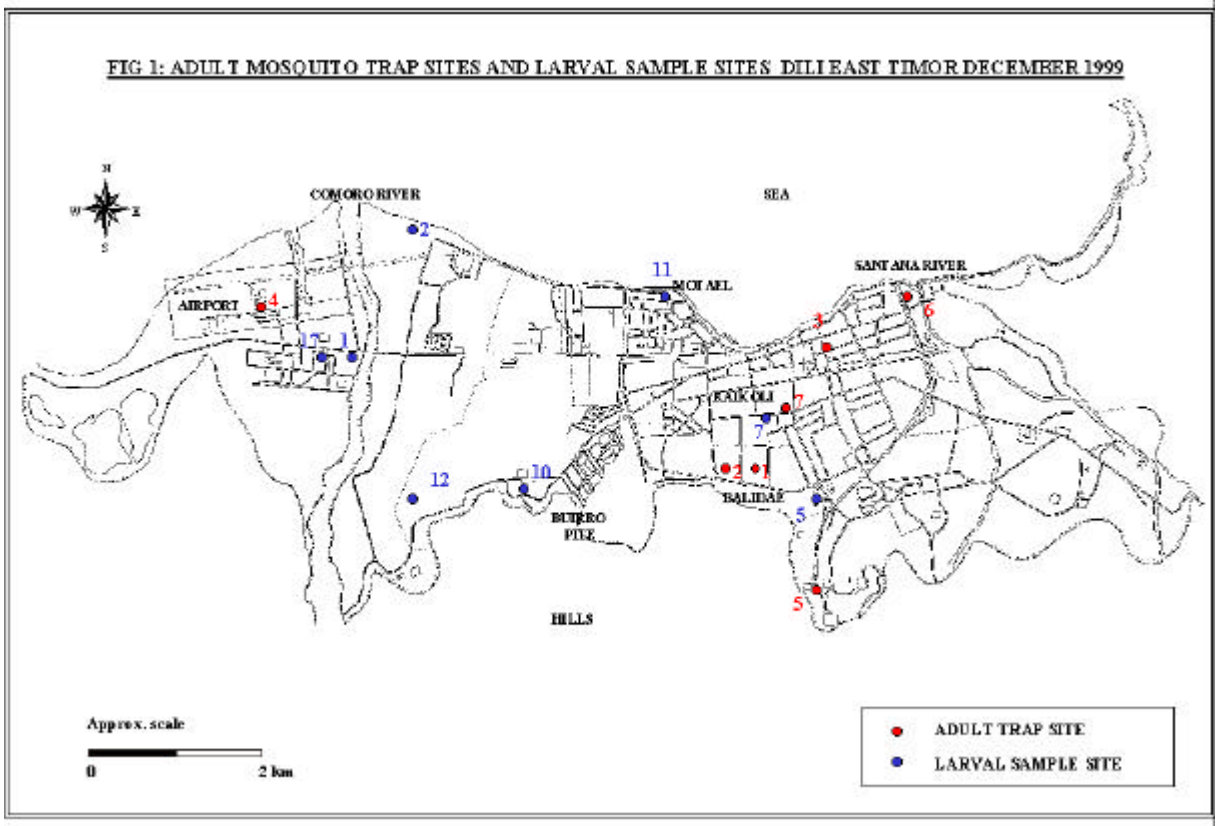
The possible solution
- An assessment of the presence of filariasis is required in Timor among residents, and returning aid workers and troops.

Pest species

The problems
- *Aedes vigilax, Cx. quinquefasciatus*, and *Ma. uniformis* are important pests in Dili
- *Aedes vigilax* has limited but productive breeding sites on the west outskirts of Dili.
- *Culex quinquefasciatus* is associated with wast water and drains.
- *Mansonia uniformis* is associated with deeper permanent water and aquatic plants.

The possible solutions
- There is an opportunity for engineering (drain clearing) and chemical control of these pest breeding sites.
- Good larval control opportunities exist by the use of local fish.
- Kankung cultivation in storm drains and flooded plots is not causing a mosquito problem.
- Control opportunities exist with the reclamation or alteration of swampland.

Since the report was presented to the United Nations there have been requests for the report from various aid agencies and defence forces from various countries. It is not known how much of the advice in the report has been implemented. Many of the potentials outlined in the report have now been realized, with a large outbreak of dengue in both troops and locals, continuing malaria transmission, and the first recorded cases of Japanese encephalitis in East Timor. The report emphasizes the value of good vector and vector borne disease information and the necessity to act quickly on such information in an emergency situation to improve public health.



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NT Malaria notifications – April to June 2001

Merv Fairley, CDC, Darwin

Nineteen notifications of malaria were received for the second quarter of 2001. 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	Comments
1	PNG	work	P.vivax	no	Diag RDH
1	PNG	work	P.vivax	yes	Diag RDH
1	PNG	student	P.vivax	no	Diag RDH
1	Indonesia	work	P.vivax	no	Diag RDH
2	Indonesia	resident	P.falc	no	Diag RDH
5	Indonesia	holiday	P.vivax	no	Diag RDH
5	East Timor	work	P.vivax	yes	Diag Westerns
1	East Timor	work	P.falc	yes	Diag Westerns
1	East Timor	work	P.falc	no	Diag RDH
1	East Timor	work	P.vivax	no	Diag RDH

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Points to note regarding notifications on page 29

- Amoebiasis, Murray Valley Encephalitis Kokobera, Kunjin, Botulism, Brucellosis, Chancroid, Cholera, Congenital Rubella Syndrome, Congenital Syphilis, Diphtheria, Gastroenteritis, Gonococcal Conjunctivitis, Haemolytic Uraemic Syndrome, Hepatitis C (incidence), Hepatitis D & E, Hydatid Disease, Leprosy, Listeriosis, Lymphogranuloma venereum, Measles, Mumps, Orthithosis, Poliomyelitis, Rubella, Typhus, Vibrio Food Poisoning, Viral Haemorrhagic Fever and Yersoniosis are all notifiable but had "0" notifications in this period.
- The number of adverse events following immunisations (AEFI) reported in this period for 2001 was more that double the number reported in 2000. This is most likely due to increased reporting of adverse events following:
  - increased education on the importance of, and legal requirement for, notification of AEFIs during the lead-up to the implementation of the new vaccination schedules on 1 May 2000; and
  - the expansion of the list of adverse events requiring notification in the 7th edition of "The Australian Immunisation Handbook", released early in 2000.
- Although no MVE cases have been recorded this quarter compared to the 6 last year, there were 2 cases in the first quarter of the year from Alice Springs district.
- Decrease in dengue numbers reflects the somewhat decreased activity of Australians and other agencies in East Timor.
- The increased numbers this quarter for chlamydia conjunctivitis (trachoma) reflects the increased numbers initially found in school screening in a Top End community.
- The increase in pertussis this year brings the NT into the epidemic being experienced in the rest of the country with the majority of cases being 10 years and older.
- The increase in invasive pneumococcal disease this year is mainly in Aboriginal people 15-50 years old in Alice Springs – a group targetted for universal immunisation.
- The rotavirus numbers this year reflect the beginning of the largest NT outbreak which began in Alice Springs in late April and spread throughout the NT.

NT notifications of diseases by districts
1 April to 30 June 2001 and 2000

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		Total	
	2001	**2000**	**2001**	**2000**	**2001**	**2000**	**2001**	**2000**	**2001**	**2000**	**2001**	**2000**
Acute Rheumatic Fever	0	3	0	1	2	2	3	1	0	2	5	9
Adverse Vaccine React.	1	0	2	1	9	4	1	0	0	1	13	6
Arbovirus infections												
Murray Valley Enceph	0	4	0	0	0	2	0	0	0	0	0	6
Barmah Forest Virus	0	1	1	0	4	4	2	0	1	0	8	5
Dengue	0	0	0	1	17	37	0	0	0	0	17	38
Kunjin	2	1	0	0	0	1	0	0	0	0	2	2
Ross River Virus	0	16	6	4	14	14	0	1	3	6	23	41
Atypical Mycobacteria	0	0	0	0	0	1	0	0	0	0	0	1
Campylobacter	21	13	1	1	42	17	7	2	7	4	78	37
Chlamydia	149	131	3	1	117	76	18	16	36	34	323	258
Chlamydia Conjunct.	1	1	0	0	28	12	0	0	1	0	30	13
Cryptosporidiosis	19	19	1	3	22	34	18	0	31	16	91	72
Donovanosis	3	0	0	0	0	1	0	0	0	0	3	1
Glomerulonephritis	3	0	0	0	1	12	1	27	0	4	5	43
Gonococcal Disease	230	198	11	8	72	43	16	14	40	45	369	308
Haemophilus Inf all type	0	0	0	0	2	0	0	0	1	0	3	0
Hepatitis A	4	1	0	0	8	7	3	0	0	0	15	8
Hepatitis B	0	1	0	0	0	0	0	0	1	2	1	3
Hepatitis C (prevalence)	7	2	0	0	30	33	1	0	5	1	43	36
HIV infections	0	0	0	0	1	2	0	0	0	0	1	2
HTLV-1	4	3	0	0	1	0	0	0	0	1	5	4
Influenza	4	2	0	0	1	1	0	2	1	0	6	5
Legionnaires Disease	0	0	0	0	1	0	0	0	0	0	1	0
Leptospirosis	0	0	0	0	0	0	0	0	1	0	1	0
Malaria	2	1	0	0	21	20	0	0	1	0	24	21
Melioidosis	0	0	0	0	7	9	0	0	0	1	7	10
Meningococcal Infection	0	0	0	0	5	2	0	1	0	0	5	3
Pertussis	18	0	0	0	8	0	3	0	2	0	31	0
Pneumococcal Disease	20	11	1	0	7	7	0	1	1	0	29	19
Rotavirus	169	72	12	2	85	4	0	1	55	5	321	84
Salmonella	22	23	2	3	52	35	4	3	17	14	97	78
Shigella	4	12	5	0	13	14	2	7	2	1	26	34
Syphilis	31	25	3	0	11	22	4	1	18	3	67	51
Trichomonas	54	77	1	6	95	78	41	52	78	70	269	283
Tuberculosis	2	3	0	1	4	14	1	0	0	1	7	19
Typhoid	0	0	0	0	2	0	0	0	0	0	2	0
Total	770	620	49	32	682	508	125	129	302	211	1928	1500

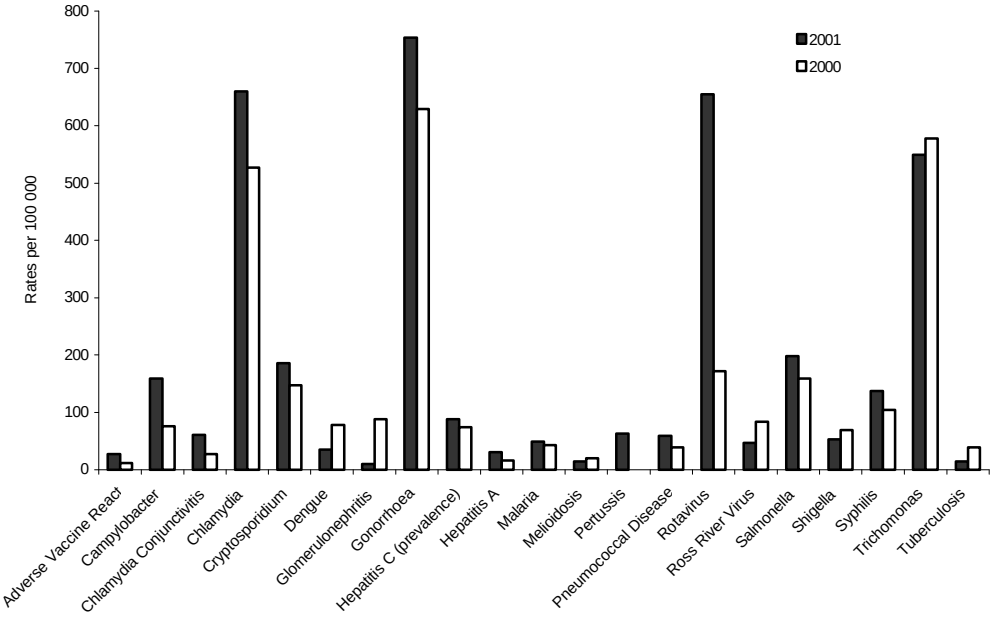
Notification of infectious diseases—Telephone: 8922 8044 Fax: 8922 8310

Notified cases of vaccine preventable diseases in the NT by report date 1 April to 30 June 2001 and 2000

DISEASES	TOTAL		No. cases among children aged 0-5 years	
	2001	2000	2001	2000
Congenital rubella syndrome	0	0	0	0
Diphtheria	0	0	0	0
Haemophilus influenzae type b	2	0	2	0
Hepatitis B	1	3	0	0
Measles	0	0	0	0
Mumps	0	0	0	0
Pertussis	31	0	4	0
Poliomyelitis, paralytic	0	0	0	0
Rubella	0	0	0	0
Tetanus	0	0	0	0

* Mumps is largely under-reported

NT wide notifiable diseases 1 April to 30 June 2001 and 2000



Rates < 10/100,000 not listed
NT est resid. Pop.—195,905 supplied by Epidemiology & Statistical Branch, THS

Disease Control Staff Updates

East Arnhem

Cindy Turner has recently joined the team in East Arnhem and will be focusing on women's sexual health issues. Cindy has been working in the East Arnhem region for 12 months and has a background in midwifery, sexual health and women's health.

Alice Springs

Ruby Kaul has been appointed as the epidemiologist for Alice Springs CDC and is newly arrived in the NT from Brisbane.

Helen McLean has transferred from Remote Health to take up the new position of Data Entry / Admin Support for CDC.

Health Development would like to thank **Lynette Purton** for all her hard work on the Rheumatic Fever / Rheumatic Heart Disease Register and look forward to working with her again. Lynette is leaving to become a first time mother.

Darwin

Dorothy Hunter has taken over from **Wanda Sneddon** as the Childhood Immunisation Data Entry Officer. Wanda has left to move interstate.

Jan Holt has been appointed as AIDS/STD urban educator and has a strong background in HIV education in community based organisations.

Daryl Thomas has returned to Darwin from Adelaide to take the position of AIDS/STD rural men's educator.

Elden Chamberlain has been appointed as the AIDS/STD policy/program officer. Elden has extensive community based organisation experience in sexual and reproductive health.

Alan Ruben has been appointed as part-time Community Paediatrician for 5 months following **Karen Edmond's** departure for an overseas position.

Rachel Webb is the new Community Paediatric registrar. Originally from New Zealand, Rachel has been in the NT for the past 18 months.

Peter Markey has recently been appointed as TB/Leprosy Medical Officer. He returns to the NT from Melbourne where he has been working in the Department of General Practice at Monash University as a Senior Research Fellow. Prior to that he was a District Medical Officer in the Darwin District from 1992 –97, during which time he completed his Public Health training.

Tennant Creek

Kirsty Jones is the new Clinical Nurse Consultant and **Brenden Wyman** is the new AIDs/STD educator. This is the first time CDC Tennant Creek have had their full complement of staff for quite some time.

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