THE NORTHERN TERRITORY

DISEASE CONTROL BULLETIN

ISSN 1440-883X Vol. 7, No. 2, June 2000

An outbreak of Australian Encephalitis due to Murray Valley Encephalitis Virus and Kunjin Virus in Central Australia, March 2000

Alex Brown, CDC, Alice Springs

'Australian Encephalitis' (AE) is an arboviral disease caused by two similar but distinct flaviviruses, Murray Valley encephalitis virus (MVE) and Kunjin virus (KUN). The virus groups exhibit a wide spectrum of clinical illness, ranging from asymptomatic infection, to severe, fatal encephalitis.

The first reported cases of human disease in Australia that were thought to be due to MVE infection, occurred in south-eastern Australia in 1917, 1918 and 1925.[1] The virus (MVE), was first isolated from fatal cases of an encephalitis outbreak in 1951.[2] The last major epidemic of AE occurred in 1974, with 58 people affected;[3] however, sporadic cases have been noted in the Northern Territory, Western Australia and Queensland.[3,4,5]

Previously there had only ever been 5 documented cases of MVE in Central Australia, 4 occurring in the 1974 outbreak,[3] and a fifth case in 1993. A further 'presumptive' case was documented in 1997.[6]

This paper gives a brief outline of recent cases of AE in Central Australia and discusses several issues that this outbreak served to highlight.

In the first two weeks of April 2000, clinicians from Alice Springs Hospital (ASH) reported several cases of undiagnosed neurological illness in both paediatric and adult patients. All patients presented with between 24-48 hours of prodromal symptoms, including malaise, irritability, high temperatures, vomiting, headache and neck stiffness.

Contents

EDITOR Vicki Krause PRODUCTION DESIGN Sue Reid

ASSISTANT EDITORS Sue Reid, Tarun Weeramanthri

Centre for Disease Control, Block 4, Royal Darwin Hospital
PO Box 40596, CASUARINA NT 0811
E mail: vicki.krause@.nt.gov.au
Website: http://www.nt.gov.au/nths/publich/cdc/bulletin.htm

Five individuals then went on to develop further neurological impairment within 72 hours of the onset of the symptomatic phase of their illness. Two of three paediatric patients developed recurrent seizures, one adult patient demonstrated a progressively deteriorating level of consciousness requiring intubation and ventilation, and another adult demonstrated significant ataxia, blurred vision and worsening confusion.

In all patients blood cultures were negative for bacterial growth. Cerebrospinal fluid (CSF) assays were negative for bacteria, negative on latex agglutination test for meningococcus, pneumococcus and Haemophilus influenzae, and were subsequently PCR negative for both meningococcus and pneumococcus. Two CSF samples were also tested for herpes simplex virus, which were also negative.

Recent documentation of the seroconversion of sentinel chicken flocks to both MVE and KUN in Central Australia, and the inability to isolate a bacterial pathogen in these cases, highlighted that arboviral disease had to be considered as a cause of this outbreak.

Of the seven patients that presented with signs and symptoms suggestive of possible AE, five demonstrated laboratory evidence of AE. Four of these were diagnosed as suffering from MVE and the other with KUN disease. Of the other two individuals, one was diagnosed with a cerebrovascular accident, and the other was considered to be suffering from a viral illness of unknown aetiology following negative arboviral serology.

Table 1 demonstrates the demographic and clinical details of the five cases diagnosed with AE, as well as the aetiological agents responsible for disease. Of the five cases, three were children aged less than five years. At least two of these children developed recurrent generalised seizures, the other may have suffered from focal seizure activity. One child continues to demonstrate severe neurological deficits.

Table 2 demonstrates the laboratory investigations performed on the five AE cases. Cases 1, 2, 3 and 5 demonstrated clear rises in the HI titre for MVE suggestive of recent infection. The smaller relative rises in HI titre for cases 2 and 3 were considered to be due to the shorter time frame between first and second serum samples. Case 4 clearly demonstrated a rise between acute and convalescent titre to KUN, without a rise for MVE virus. Of the 4 MVE cases, three demonstrated quantifiable rises in KUN titres, yet had only weak or negative IgM levels for KUN. This was thought to result from primary MVE virus infection, with cross-reactivity responsible for the rise in KUN serological markers.

Examination of CSF demonstrated a predominance of monocytes for three of the five individuals. Of three samples checked for biochemistry, all demonstrated a normal glucose level with an elevated CSF protein.

Table 1 Demographics, date of onset, clinical details and aetiology of Australian Encephalitis cases, Central Australia, 2000

Case No.	Date of onset	Age	Sex	Symptoms/Signs	Outcomes	Aetiology
1	25/3/00	69 years	M	Fever, headache, deteriorating conscious state	Ongoing neurological deficits	MVE
2	27/3/00	3 months	F	Fever, recurrent seizures, Acute flaccid paralysis	Global neurological deficits	MVE
3	3/4/00	2 months	M	Fever, irritability, seizures	Resolved	MVE
4	3/4/00	4 years	M	Meningism, fever, vomiting (? focal seizures)	Resolved	KUN
5	13/4/00	30 years	M	Meningism, fever, ataxia, confusion	Resolved	MVE

Table 2 CSF and serology results for Australian Encephalitis cases, Central Australia, 2000

Case No.	Date	MVE HI Titre	MVE IgM	KUN HI Titre	KUN IgM	CSF				
						Date	PMN's x10^6/L	Mono's x10^6/L	Protein g/L	Glucose mmol/L
1	30/3/00	1:10	+ve	<1:10	-ve	29/3/00	70	110	0.81	3.6
	24/4/00	1:320	+ve	1:80	weak					
2	6/4/00	1:40	+ve	1:80	-ve	29/3/00	250	300	2.5	3.2
	11/4/00	1:160	+ve	1:40	-ve					
3	8/4/00	1:40	+ve	<1:10	-ve	5/4/00	510	40	Not tested	Not tested
	10/4/00	1:160	+ve	1:20	-ve					
4	7/4/00	<1:10	weak	1:10	weak	8/4/00	110	75	Not tested	Not tested
	3/5/00	<1:10	-ve	1:160	+ve					
5	17/4/00	1:320	+ve	1:320	weak	17/4/00	50	140	0.94	2.3
	4/5/00	1:10240	+ve	1:20480	weak					

Discussion

The first two weeks of April, 2000, saw admissions to ASH of both elderly and very young patients with symptoms and signs of meningitis and/or encephalitis. Initial diagnostic efforts focussed on the possibility of partially treated bacterial meningitis. The use of antibiotics in the community before patients were admitted to hospital was thought to be the reason that no causative bacterial organism could be isolated from blood, CSF or nasopharyngeal cultures. The diagnosis of arboviral encephalitis was considered following the clustering of multiple cases. This provisional diagnosis was reinforced with the release of information demonstrating MVE and KUN antibodies in sentinel chickens in Central Australia and high numbers of *Culex annulirostris* following unusually high regional rainfall.

Sentinel chickens in the NT have demonstrated evidence of both MVE and KUN activity in most years since their establishment, particularly in the Top End, and less frequently in the Central Australian region.[7] Previous seroconversion in the Barkly and Alice Springs regions have historically occurred following higher than average rainfall. This situation was mirrored this year, with the highest recorded rainfall for both February and April since 1942 (personal communication. A. Hankins, Bureau of Meteorology, Alice Springs, 2000). As had been documented previously, the first cases occurred within two weeks of the initial heavy rains.

Historically, there have been very few documented cases of AE in Central Australia. This may have led to delay between initial presentation of the first two cases and subsequent diagnoses.

Significant case fatality rates and the high percentage of individuals with AE (particularly due to MVE) who develop long term neurological sequelae, highlight the need for early detection, rapid diagnosis and institution of necessary supportive therapy for individuals with AE.

Whether the delay between initial presentation of individuals and their diagnosis and intervention increases the risk of an infected individual developing severe sequelae remains to be fully elucidated. However, such delays may hinder the timely institution of efforts aimed at raising community awareness regarding methods to avoid disease transmission and thus may impede the prevention of disease among 'at risk' communities.

This outbreak should act as a warning and highlight the need for future vigilance, particularly in terms of clinical and arboviral surveillance activities and when climatic conditions are ideal for virus transmission.

Sentinel chicken surveillance results and particular climatic features may alert public health networks to the likelihood of possible AE cases and the need to raise awareness among the community and health care service providers.

Furthermore, the temporal and geographical relationship between documented cases in north-western Western Australia, and the outbreak in Central Australia not only highlights the importance of surveillance of diseases across geographical regions, but may assist in the early detection of future outbreaks.

References

1. Anderson SG. Murray Valley Encephalitis and Australian X Disease. *J Hyg* 1954; 52: 447-468.
2. French EL Murray Valley Encephalitis isolation and characterisation of the aetiological agent. *Med J Aust* 1952; 1: 100-103.
3. Bennett NMcK. Murray Valley Encephalitis, 1974. Clinical features. *Med J Aust* 1976; 2: 446-50.
4. Whelan P and Burrow J. Australian Encephalitis in the NT. *NT Comm Dis Bull* 1994; 2(4): 21-23.
5. Mackenzie JS, Smith DW, Broom AK, Bucens MR. Australian Encephalitis in Western Australia, 1978-1991. *Med J Aust* 1993; 158: 591-595.
6. Merritt A, Phillips DA, Carney I, Whelan P. A presumptive case of fatal Murray Valley Encephalitis acquired in Alice Springs. *Comm Dis Intell* 1998; 22:103-104.
7. Whelan P. Australian Encephalitis in the Northern Territory. March 2000. Territory Health Services.

Cluster of encephalitis and meningitis in children in the Top End of the NT

Karen Edmond, CDC, Darwin

Seven children with encephalitis and meningitis have been admitted to Royal Darwin Hospital (RDH) in April and May this year. Their ages ranged from 30 days to 15 years.

Three children had confusing Murray Valley Encephalitis (MVE) test results requiring further assessment. All three had negative cerebrospinal fluid (CSF) bacterial culture but raised CSF mononuclear cell count and raised CSF protein levels. One had positive CSF polymerase chain reaction (PCR) for MVE; one had positive CSF IgM for MVE; and one - with negative CSF and serum PCR and IgM for MVE - had cerebellar, basal ganglia and bilateral thalamic low T1/high T2 signals on Magnetic Resonance Imaging (MRI). Similar MRI imaging has been seen in one adult patient with proven MVE.[1] This child presented with seizures, depressed conscious state, rash and fever. Two weeks after presentation, ataxia and cognitive impairment are present but continue to improve. The other two children had no significant neurological signs and now are completely well. Likely conclusions are that the child with positive PCR for MVE was a false positive and the other two cases are probable MVE, however we await further serological testing.

Two other children had negative CSF bacterial culture, raised CSF mononuclear cells and raised protein levels. These two children had negative CSF viral culture, negative CSF PCR and IgM for MVE and herpes simplex virus. These two children also had negative serology for MVE and other flaviviruses. They also had negative serology for herpes simplex, echo, coxsackie, mycoplasma and kunjin viruses. These two children presented with low grade fever and irritability, one with a bulging fontanelle and one with meningism and had received antibiotics. Both have remained well and were probably partially treated bacterial meningitis cases when cultures were collected.

Two children had positive bacterial cultures. One presented with flaccid paraparesis and bulbar palsy and *Burkholderia pseudomallei* was grown from her CSF. She is improving slowly, but remains an inpatient at RDH, still has a tracheostomy and mobilises with a wheelchair (6 weeks after presentation). The other child grew *Neisseria meningitis* from CSF, has received 6 days of IV penicillin treatment, and is also improving. This child is unlikely to have any neurological deficit.

These cases followed 3-4 weeks after a cluster of four cases of MVE and one Kunjin case in Central Australia (see previous article) and two MVE cases diagnosed in Darwin (see next article).

Reference

1. Burrow JN, Whelan PI, Kilburn CJ, Fisher DA, Currie BJ, Smith-DW. Australian encephalitis in the Northern Territory: clinical and epidemiological features, 1987-1996. *Aust NZ J Med* 1998; 28(5): 590-6.

Top End Murray Valley Encephalitis (MVE) cases

CDC, Darwin

Two confirmed and one other suspected case of Murray Valley Encephalitis (MVE) have recently been notified to CDC, Darwin. The first confirmed case was a 25 year old UK tourist who acquired the viral infection in late April while travelling through Broome in Western Australia (WA). He remains in a serious condition in Royal Darwin Hospital (RDH). The other confirmed MVE case was also acquired in WA in early May. This 72 year old female was admitted to RDH on 14 May but subsequently developed complications and died 26 May. The third suspected case is a 15 year old boy, thought to have acquired the infection while fishing with his family on the Limmen River (between Roper River and Borroloola) late April. Serological confirmation is pending.

East Timorese evacuees in Darwin – 1999

Christine Evans,[1,2] Sara Noonan,[1] Vicki Krause[1]
[1]CDC, Darwin, [2]MAE program, NCEPH, ANU, Canberra

Abstract

In September 1999, 1863 East Timorese people were evacuated from the United Nations compound in Dili East Timor to Darwin, Northern Territory (NT), following escalating violence precipitated by the vote for independence made by the majority of East Timorese people on August 30 1999. Providing health care services to meet the needs of the evacuees required a major public health effort by NT government and volunteer health workers and community health organisations. In the weeks following their arrival all evacuees had a mandatory Commonwealth health screen, 100 were admitted to Darwin hospitals, 324 were reviewed in a 'fever/ chest' clinic, 1218 reviews were conducted at the Kalymnos camp clinic and 7 infants were born. Communicable diseases surveillance detected 14 cases of malaria, 51 initial cases of TB (61 by week 6), 17 laboratory confirmed infectious diarrhoeas and 3 cases of laboratory confirmed measles and 14 suspected measles cases.

Introduction

On 5 May 1999, Portugal, Indonesia and the United Nations agreed to resolve the issue of East Timor's future through a popular consultation with the East Timorese people to determine whether a proposed 'special autonomy' for East Timor while staying within the Republic of Indonesia would be accepted or rejected by the East Timorese people. On 11 June the United Nations Mission in East Timor (UNAMET) was established to organise and conduct the popular consultation. UNAMET proceeded to register 451,792 voters in East Timor and across the world from a total population of 860,000 people.

On 30 August 1999, the people of East Timor voted in a secret ballot for the future of the Territory. On 3 September, the results of the ballot indicated that 78.5% of voters had voted against the proposed 'special autonomy' and expressed a wish to begin a transition to full independence.[1] Within days of the announcement, increasing violence had forced hundreds of thousands of East Timorese to flee their homes. Within weeks 75% of the population was displaced and 70% of the Territory's housing and utilities had been destroyed. An estimated 150,000 - 200,000 East Timorese were deported to West Timor and some 500,000 were believed to have fled to the country's remote hilly areas. The capital city Dili was largely destroyed.[2,3] Fleeing the violence, some 2,000 residents of the capital Dili, sought refuge in the UNAMET compound. Conditions within the compound were reported as 'appalling' with little food available and no sanitation facilities and there were fears for the safety of those inside the compound should United Nations staff depart.[4]

Between 10 and 14 September 1999, 1863 people were evacuated from the UNAMET compound to Darwin, NT, in two groups. There had been no capacity for pre-evacuation screening. The first group of 347 evacuees, airlifted on 10 September consisted mainly of East Timorese UNAMET staff and their families. The second group of 1516 included UNAMET workers and Dili residents who

had taken refuge in the compound. On arrival religious, medical and immigration personnel met the evacuees. Those in need of urgent medical care were transferred directly to hospital. Those remaining were issued with 'safe haven' visas and transported to 'Kalymnos' camp, a tent city erected in Darwin.

The evacuees arrival in Darwin prompted a major response by NT government agencies, community and religious organisations and the greater Darwin community, to meet the physical, health and spiritual needs of the group. The Centre for Disease Control (CDC), Territory Health Services (THS) was responsible for organising mandatory Commonwealth health screening for all evacuees, maintaining communicable disease surveillance, developing local policies for the control of communicable diseases and provision of a fever/ chest clinic to review cases of suspected or confirmed communicable disease.

Health care services and screening were provided at a number of sites across Darwin including the Marrara sports stadium (arrival), Kalymnos camp clinic, Danila Dilba Medical Service and other independent community health centres, THS Community Care Centres, the Royal Darwin and Darwin Private hospitals and the Menzies School of Health Research.

CDC staff collected health data from a number of sources with the aims of:

- Rapidly identifying and responding to communicable diseases;
- identifying the major health care needs of this group; and
- promoting continuity of care, particularly for East Timorese people transferred to southern safe havens.

This report describes the major health findings for East Timorese evacuees in the period between their arrival and relocation to southern safe havens or dispersal into the broader Darwin community.

Methods

Evacuee health and demographic data were collected from a number of sources and entered by volunteer health care workers and administrative staff into a relational database (Microsoft Access) designed by a member of the CDC staff.

Demographic data including identification number, names, gender and date of birth were recorded at mandatory Commonwealth health screening and later cross referenced with data provided by the Department of Immigration (DIMA). Family relationship data were made available by DIMA.

All evacuees underwent a mandatory Commonwealth health screen, according to a protocol modified for the population and circumstances. Chest x-ray for TB screening was lowered to age 12 from 15 in recognition of suspected high prevalence of disease. Group 2 evacuee screening was further modified to reduce examinations with limited immediate health gain (eg routine vision and urine testing), as these caused significant screening delays. Results were generally recorded immediately following individual screening episodes and included details of self reported illness, physical examination findings and chest x-ray results.

Episodes and reasons for attending a CDC fever/ chest clinic, which provided adult and paediatric reviews for individuals with known or suspected communicable diseases and for pregnant women were recorded on daily worksheets. These were later coded for analysis eg fever, cough, abnormal chest x-ray and TB, pregnancy, diarrhoea and vomiting/gastro, URTI/chest infection, rash, malaria, varicella, measles, bloody diarrhoea and 'other' or combination of these.

Notifiable diseases were defined according to CDC NT notifiable conditions reporting guidelines[5] and were reported directly to CDC by laboratory and clinical staff. The majority of group 1 evacuees were also screened for TB by Mantoux testing and for malaria by microscopy blood smears. Group 2 individuals were not routinely Mantoux tested and malaria screening was done only for those with symptoms and for pregnant women.

Non-notifiable enteric pathology data were collected so that significant enteric pathogens could be identified. Non-positive enteric, malaria, serological and respiratory pathology results were recorded to provide denominator data for reporting of communicable diseases.

Hospital admission and discharge data were updated daily with information provided from both Royal Darwin and Darwin Private Hospitals. Full details of discharge summaries, including discharge diagnoses were recorded retrospectively.

Pregnant women were defined as any evacuee identified by urine testing to be pregnant on entry to Australia. Health data collected for this group

attempted to include parity, results of serological testing for varicella and rubella, haemoglobin, malaria screening, hospital admission and delivery data.

Health service utilisation for acute care at Kalymnos camp clinic were collected on worksheets and retrospectively collated. The minimum number of clinical contacts for each Darwin diagnosed TB case was calculated by estimating that two contacts were required on the day of admission to a treatment program or TB house (RN and MO), followed by a daily contact (RN) and 2 contacts on the day of discharge (RN and MO). Immunisation data recorded on worksheets were entered retrospectively.

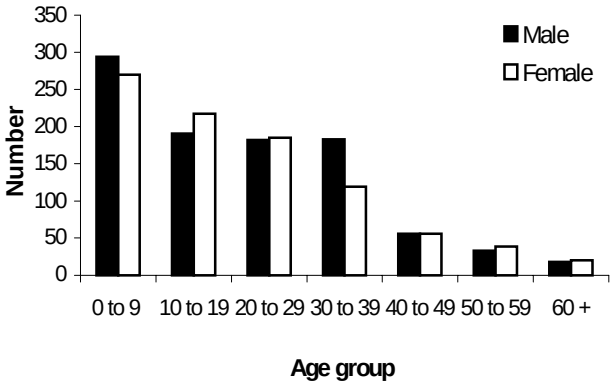
The periods for data collection differ, reflecting varied closure or cessation of health services or activities such as the CDC fever/chest clinic, Kalymnos camp clinic and Commonwealth health screening.

Results

Demographics

A total of 1863 East Timorese people were evacuated to Darwin in two groups. The first group of 347 (18.6% of total population) evacuated on 10 September comprised UNAMET workers and their families. In this group 64.6% were male and 64.2% were aged between 20 and 50 years and 35.8% were less than 20 years. The second group of 1516 (81.6%) evacuated throughout the day of 14 September included UNAMET workers and Dili residents. In this group 51.6% were female, 36.8% were aged between 20 and 50 years and 56.3% were aged less than 20 years. Overall (see Figure 1) 51.4% of the total evacuated population were male, 52% were aged less than 20 years, 15.6% were less than 5 and 2.8% (53) were less than 1 year. There were 38 people aged 60 years and

Figure 1 Demographic profile of East Timorese evacuees, September 1999



Commonwealth health screen results

The majority completed screening between 10 September and 8 October with the major health conditions found shown in Table 1. Acute conditions reported include diarrhoea (n=18) and respiratory tract infections (n=35). Ear complaints were reported for 4.5% with 28 cases of otitis media, 14 of otitis externa, 12 with discharging ears and 30 with perforated or scarred tympanic membranes. Fungal skin infections were reported in all age groups. The majority (93.1%) of dental problems reported were caries. Eye problems included 9 acute infections and 16 with visual impairment. Pain particularly chest, back or abdominal was reported by 66 adults. Anxiety, depression and trauma were recorded in each age group above 5 years.

The two major chronic conditions were hypertension (n=31) and COAD (n=21). Only 2 cases of diabetes were reported in females aged 28 and 39 years. Eighteen (58%) of the reported cases of hypertension were aged less than 50 years, the youngest person being a 23 year old male. Slightly more men (58.1%) than women had hypertension .

Table 1 Major health conditions found at Commonwealth health screening

	ENT	Dental	Resp	Cardiac	GIT	Skin	Eyes	Chronic	Other
0 to 4	20	5	22	5	16	7	7	0	19
5 to 9	18	17	19	4	7	12	1	0	14
10 to 19	26	13	19	4	18	22	1	0	35
20 to 29	13	26	19	13	13	11	4	28	33
30 to 39	9	23	38	1	19	12	4	9	14
40 to 49	2	8	13	1	5	5	5	10	9
50+	6	9	25	5	6	4	11	14	10
Totals	94	101	155	33	84	73	33	61	134

CDC fever/chest clinic review

A total of 363 reviews of 324 individuals (17.4% of population) occurred in the CDC fever/chest clinic between 10 September and 5 October. Twenty-four percent of those reviewed had more than one review indication listed. TB, cough and abnormal chest x-ray were the most common indications recorded for review (see Table 2). Fever, URTI/ chest infection and diarrhoea and vomiting (D&V) were also frequently reported.

Children aged less than 10 years accounted for 32% of the total CDC visits with others listed in Table 3. The proportion of each age group requiring review was high across all age groups ranging from 9.1% for those aged 10-19 years to 36.8% for those aged 60 or more (see Figure 2), with 20.3% of all children aged 0-4 reviewed.

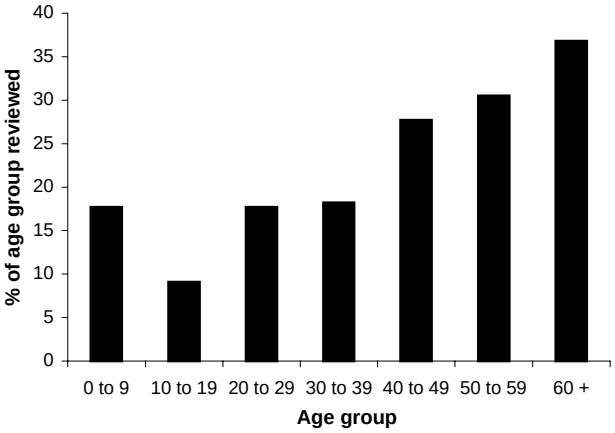
Table 2 Indications listed for CDC fever/chest clinic 1st, 2nd and 3rd reviews

Indication for review	Review 1	Review 2	Review 3
Cough	64	6	0
TB	67	15	1
Abnormal chest x-ray	86	5	0
URTI/chest infection	23	0	0
Fever	43	4	0
D&V	24	5	0
Malaria	17	1	0
Pregnant	14	2	0
Rash	1	0	0
Others	34	7	0

Table 3 CDC fever/chest clinic reviews by age

Age group	Total visits	% CDC visits
0 to 9	116	31.9
10 to 19	42	11.6
20 to 29	67	18.5
30 to 39	65	17.9
40 to 49	34	9.4
50 to 59	24	6.6
60 +	15	4.1
Totals	363	100.0

Figure 2 Proportion of age group reviewed in CDC fever/chest clinic



Hospital admissions

Between 10 September and 26 October, 107 evacuees were admitted to Darwin hospitals. Seven admissions were newborns delivered within six weeks of their mother's arrival. Five individuals were admitted twice making a total of 112 admissions. Excluding newborns and multiple admissions, 5.4% (n=100) of the evacuees required hospital admission. There were 17 admissions on the day of group 2's arrival and 11 coinciding with an outbreak of measles.

Seventy-four (66.1%) hospital admissions occurred in the 2 weeks following arrival of the first group of evacuees (see Figure 3). The majority of hospital admissions (65.2%) were for communicable diseases including malaria, TB, gastrointestinal illnesses, chest infections and measles. Of hospital admissions, 55 (49.1%) were of children aged 0 – 9 years, with 39 (34.8%) of the total admissions children 0 – 4 years (see Figure 4).

Figure 3 East Timorese evacuee hospital admissions, 10 September to 8 October (end of Commonwealth health screening exercise)

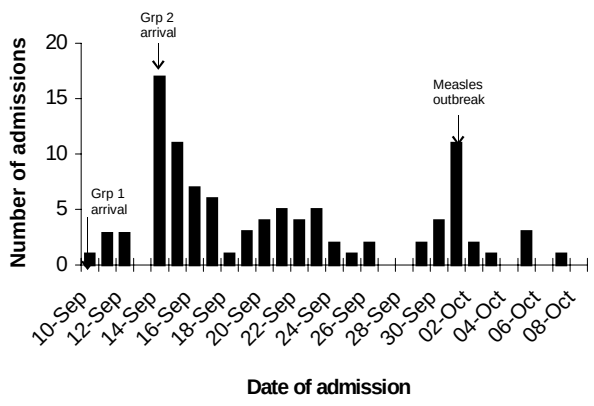
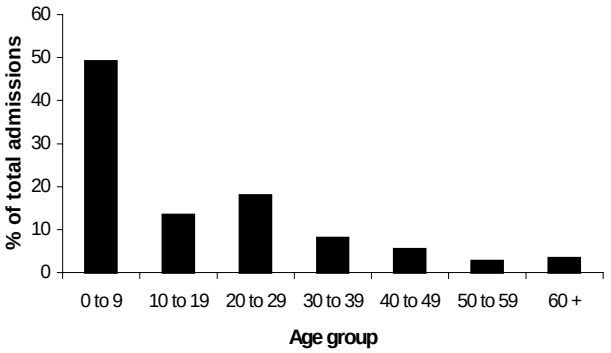


Figure 4 East Timorese evacuee hospital admissions by age



Pregnant women

There were 45 pregnant women aged 17 – 43 years, with parity ranging from G1P0 – G11P10. Of those with haemoglobin (HB) tested 41.4% (12/29) had an HB <10 mmol/L including one<6mmol/l. In comparison, 12.5% (3/24) of women who were not pregnant and had a HB measured, (eg for malaria screening) were anaemic. Rubella immunity data was available for 10/45 (22.2%) and 8/10 were immune, with one aged 43 non-immune and another age 24 with doubtful immunity. Only 35/45 pregnant women were tested for malaria. This was because the decision that all antenates be screened for malaria was made after Commonwealth health screening had commenced. Efforts were made to follow up all pregnant women who had not had a malaria screen, however locating individuals in Kalymnos camp proved difficult. No known cases of malaria occurred in pregnant women.

Seven women delivered in Darwin, one requiring emergency caesarean section. One woman was admitted for pregnancy-induced hypertension and polyhydramnios at 31 weeks gestation and another for spontaneous abortion.

Communicable diseases surveillance

There were 14 cases of malaria detected, 3 in the first group of evacuees (3/347 tests, slide positivity rate (SPR) 0.9%) and 11 in the second (11/223 tests, SPR 4.9%). One mixed Falciparum/Vivax infection occurred, 6 Vivax, 4 Falciparum and 3 Malariae. Seven cases were in children aged less than 15 years old.

Initially 51 cases of TB were diagnosed in Darwin, though subsequent culture results and presentations raised this to 61. Three cases of measles were notified and investigation of 14 from suspected cases is continuing (vaccine induced v's true cases). A single case of hepatitis B carriage was reported. Nineteen cases of infectious diarrhoea were identified, 4 campylobacter, 6 S*higella flexneri* (3 x type 2a and 3 x type 4a, 2 were sibling cases), 7 rotavirus and 2 giardia. Several different enteric parasites were detected including 4 trichuris trichuria, 4 ascaris and 3 hookworm.

Immunisations

Children from Group 1 were immunised during the Commonwealth health review according to NT Childhood Vaccination Schedules. Group 1 adults without contraindications were given oral polio vaccine (OPV) and adult diphtheria tetanus (ADT) vaccine. Those less than 30 years were given measles, mumps and rubella (MMR) vaccine. To facilitate screening, Group 2 evacuees were not initially immunised in Darwin as rapid transport to southern havens where full immunisation would be given was envisaged.

Overall 335 individuals received OPV, 268 received tetanus immunisation (either DPT or ADT) and 35 children were given Haemophilus influenzae type b (Hib) vaccine. In total, 807 MMR's were administered, 605 to group 2 evacuees following identification of a cluster of measles in the camp on September 20.

Health service usage

A minimum of 4,115 contacts with health care services by East Timorese evacuees occurred in the 12 days following arrival, which was the duration of the mandatory Commonwealth health screening exercise. 1773 individuals had a health screen, 324 a CDC fever/chest clinic review, 1119 were seen at the Kalymnos camp clinic, 59 were admitted to hospital, 215 had Mantoux readings and at the very minimum 625 contacts made for individuals diagnosed with TB. By the end of October 1999, a minimum of 5,741 contacts with health care services had been made.

Health contact data was not available for services delivered by hospital Accident & Emergency Departments, at GP services, specialist and community clinics and for some of the pregnant women reviews. Rapid assessment contacts immediately following arrival of the evacuees are also not counted.

Discussion

The arrival of 1863 East Timorese in Darwin over 4 days in September 1999, required the mobilisation of hundreds of health professionals and support

workers to provide health care services, prevent outbreaks of disease and to complete mandatory Commonwealth health screens.

The major morbidities for the evacuees on arrival and in the period immediately following were acute conditions such as respiratory tract infections, diarrhoea, ear infections, malaria and measles. These health problems are not dissimilar to those experienced by refugees and internally displaced people (IDP's) worldwide, especially in the 'emergency' or early phase of a mass population movement.[6,7,8] TB was also a significant health problem for the group reflecting high background rates of the disease in East Timor.

Children, especially those under 5 years, required high levels of health care in keeping with international experience.[8] Although accounting for 17% of the total population, children 0–4 years were responsible for 18.2% of CDC fever/chest clinic reviews and more than 34.8% of hospital admissions. When newborns and boarders are excluded, infectious diseases or symptoms of these were responsible for all but one hospital admission for this age group. Overall children less than 10 years accounted for 32% of the total CDC fever/ chest clinic reviews and 49.1% of all hospital admissions.

The proportion of each age group in need of CDC fever chest/clinic review increased with age from 20 years onwards and was high across all age groups reflecting the acute care needs and protocols that encouraged review for individuals with a known or suspected communicable disease. More than one third of adults aged 60 and above required a fever/ chest clinic review and this was attributable to acute needs, the frailty of some of the elderly evacuees and the increased probability of abnormal examination findings in this group. Although there were only 4 hospital admissions for this age group they had the highest proportion of hospital admissions for any age group and included the only death.

The most commonly reported Commonwealth health review chronic diseases were hypertension (mostly self-reported or one off BP recording) and COAD (based on chest x-ray). It is also likely that diabetes was self-reported as routine screening was not undertaken.

The major antenatal health problem for pregnant women was anaemia, with more than 40% found to be have an HB less than 10 mmol/l. This was important both obstetrically and for flight safety as many required oxygen when journeying to southern havens. Although numbers for comparison were small, the lower rate of anaemia in non-pregnant women suggests anaemia in pregnant women was pregnancy related. Obstetric and gynaecological hospital admissions were responsible for more than a third of hospital admissions in the 20 – 29 year age group and therefore the increased rate of admission in this group.

Despite the presence of many infectious enteric pathogens in the camp notably *Shigella flexneri*, rotavirus, campylobacter and giardia, no outbreaks of diarrhoeal disease were reported from the camp, suggesting high environmental and personal health standards. The only reported outbreak of communicable disease linked to the camp was a measles outbreak on 30 September which led to a rapid public health intervention the day following, where over 600 individuals were immunised by administering MMR vaccine to the second group. This experience highlights that MMR in such situations should be administered as early as possible.

While the entire population evacuated did have a developing country demography (ie more than 50% aged less than 20 years), the composition of group 2 was dissimilar to group 1. Group 2 had more young children, were the only group with people over 60, including some quite frail and had most of the arriving pregnant women including those who delivered within weeks of arrival. This group may have included those unable to flee the city for the comparative safety of the hills. This vulnerability and the poor conditions within the UNAMET compound contributed to the acute health problems of the evacuees.

Conclusion

The health profile of the East Timorese people evacuated to Darwin in September 1999 was not dissimilar to that of many refugees and IDP's worldwide. They did arrive however in a country and city capable of and willing to respond rapidly to their health care needs.

Acknowledgments

The health data presented in this report are the result of hundreds of hours of work by health professionals who provided care, by administrative assistants and others who entered data, health care

staff who filled in work sheets at various clinics and those who assisted with data collection from both Darwin hospitals. Without their collective efforts there would have been no timely data to rapidly assess and inform policy and to plan the workforce needed.

References

1. http://www.un.org/News/Press/docs/1999/19990903.sgsm7119.html
2. http://www.unhcr.ch/news/pr/pr990909.htm
3. United Nations Inter-Agency and Non-Governmental Organisation Preliminary Assessment of Needs for Humanitarian Assistance for East Timorese. Oct, 1999.
4. http://www.unhcr.ch/news/pr/pr990909.htm
5. Northern Territory Department of Health and Community Services. New Guidelines for the reporting of notifiable conditions in the Northern Territory. January 1995.
6. Toole MJ, Waldman RJ. Prevention of Excess Mortality in Refugee and Displaced Populations in developing Countries. *JAMA*. 1990; 263 (24): 3296-3302.
7. Toole MJ, Waldman RJ. Refugees and Displaced Persons – War, Hunger and Public Health. *JAMA* 1993; 270 (5): 600-605.
8. Marfin, A.A., Moore, J., Collins, C. et al. Infectious Disease Surveillance During Emergency Relief to Bhutanese Refugees in Nepal. *JAMA* 1994; 272 (5): 377-381.

Histamine fish poisoning (Scombroid) incident – Darwin

Barbara Klessa and Paul Csizmadia, Environmental Health Branch, Territory Health Services

Introduction

On Wednesday 17 November 1999, five guests contracted food poisoning after consuming Grenadier fish fillets at a dinner party held at a hotel in Darwin.

Of the five cases, one was hospitalised and recovered soon after receiving antihistamine tablets.

The main course consisted of a choice between the fish and duck dishes. The fish course was served as one fillet sliced into two, which was served to 50% of the guests.

During the course of the dinner some guests rejected the fish while others only consumed one of the two slices of fish due to the smell and/or taste which was said to be very salty.

Brief outline of individual cases

Dinner guest #1

Within half an hour of consuming the two slices of fish the diner's face began to glow red, followed by a rash covering her chest, arms, abdomen and knees. She felt a lump developing in her throat and an ill feeling. A short time later extreme diarrhoea and shivering resulted. An ambulance was called and she was taken to hospital. While in hospital she was placed on a drip and given antihistamine medication. She felt partially recovered about an hour later and made a full recovery two days later. Of the two slices of fish consumed by this diner one tasted salty.

Dinner guest #2

Within half an hour of consuming the two slices of fish, the diner's face began to glow red and his lips and tongue tingled. Approximately two hours later diarrhoea occurred which continued throughout the night. A general recovery was made the following day. Of the two slices of fish consumed both tasted salty.

Dinner guest #3

Approximately two hours after consuming the two slices of fish she had an onset of diarrhoea and experienced headaches all the next day. Hives also appeared on her arms. Of the two slices of fish consumed both slices tasted very salty.

Dinner guest #4

While eating the fish her gums started to throb. She felt slightly nauseous that night and then severe diarrhoea commenced at 3am the following morning and did not cease and she presented to her GP two days later. Her diarrhoea continued and she made further appointments to see her GP. Of the two slices of fish consumed both slices tasted very salty.

Dinner guest #5

Approximately two hours after consuming the fish he experienced a severe 'gut ache' followed by diarrhoea. He continued to have headaches for the following two days. He had consumed one and a half slices of fish which had a distinct mineral/salty taste.

Guests who were served fish and rejected the meal due to the smell and/or the very salty taste had no ill effect on the night.

Investigation – Northern Territory (NT)

An inspection of the hotel kitchen by Territory Health Services, Environmental Health Officer (EHO), revealed that satisfactory conditions were being maintained.

An interview with the hotel chef revealed that the fish was purchased directly from a company in South Australia (SA). There was no reason to believe that any other contaminated product from this consignment had been delivered to Darwin or any other part of the NT.

Records held by the airline which transported the food were checked to ascertain any "cold chain" problems, ie whether there was any point of time during transport when the fish could have been subjected to variance in temperature. On the night of 11 November 1999, the SA distributor delivered a consignment of fish to the airline's Adelaide freight depot to be placed on a direct flight to Darwin the next morning.

On 12 November the fish consignment was not placed on the direct flight to Darwin but on a flight via Alice Springs, where the consignment was off loaded and not placed back on board due to flight time delays. The consignment therefore remained over night in Alice Springs. The airfreight company does have cool room facilities at Alice Springs airport.

The airfreight company's service delivery manager for the NT stated that on 13 November the fish consignment from Alice Springs to Darwin would have been transported over to the airline's area at least half an hour prior to loading. The flight arrived in Darwin at 1.45 pm.

On arrival in Darwin the fish was transferred to the airline's freight depot where goods are sorted. The airfreight company then advised the hotel that the consignment had arrived. According to the airfreight company's service delivery manager the fish consignment may or may not have been placed into cold storage prior to the time that a local courier service arrived to collect the fish and deliver it to the hotel. It was discovered that only very recently the airfreight company's Darwin depot has begun separating perishable and non-perishable goods.

According to the records of the courier company a phone call was received from the hotel at 3:16 pm and the courier picked up the consignment from the Darwin freight depot at 3:36 pm and delivered the fish directly to the hotel at 4:00 pm.

The fish was delivered in a sealed, chilled polystyrene box, to the hotel's receiving stores section, and then immediately transferred to the kitchen and placed into the coolroom.

According to the chef the fish fillets are sliced to size and then cryovac packed and placed into the deep freeze. When the fish is required the sliced fillets are thawed out in the cool room prior to cooking.

In summary the fish was potentially unrefrigerated for the following periods of time:

1. At Adelaide while awaiting placement on the flight to Alice Springs.
2. At Alice Springs for an unknown length of time, possibly overnight.
3. At Darwin from arrival at 1:45 pm until delivery at hotel 4:00 pm.

Three fillets in their original hotel cryovac pack were left over from the suspected batch and sent to the Australian Government Analytical Laboratories (AGAL), Victoria, for analysis.

Investigation – South Australia

A EHO in the Food Standards Section, Environmental Health Branch, SA Department of Human Services was contacted to trace the fish within their jurisdiction (in this case, from its source to the airport). Their investigation showed that the fish processing/distribution company have a Hazard Analysis Critical Control Point (HACCP) based system in place for quality control of their products. This means that clear records are kept at all points in the processing and distribution system while the food is on their premises.

The fish was received at the processing company on 11 November, the same day that it was dispatched to Darwin. The temperature was recorded on arrival at the processing company at 1°C. It was visually clean and free of contaminants. Upon receival it was covered with ice and placed into active refrigeration at a temperature between 0-2°C. All processing was carried out in a quality controlled environment.

The product was delivered to the airfreight depot in a refrigerated vehicle.

Action taken in NT

On inspection of the hotel kitchen 3 unused fillets

from the same batch were found. These were handed over by the chef for analysis. The fillets were sent to the AGAL in Melbourne to be tested for the presence of histamine. The diner who had been hospitalised had been treated with antihistamine and due to her favourable response to this treatment it was felt that the illness had been caused by an allergic reaction to the fish.

The test results from AGAL showed the average level of histamine determined in the three fillets to be 4770 mg/kg.

The Australia New Zealand Food Standards Code states that the level of histamine in a composite sample of fish must not exceed 100 mg/kg.

Conclusion

There was a likely break down in the cold chain during the delivery of this product from Adelaide to Darwin. The NT Environmental Health Branch advises purchasers of food to check the temperature on receipt and to refuse any product which appears deteriorated in any way.

****

The following are extracts from the summary of: ***Histamine (Scombroid) Fish Poisoning – A review in a risk-assessment framework.*** This paper is an excellent review of the subject and is published by L. Lehane and J. Olley of the National Office of Animal and Plant Health, Canberra 1999.

Histamine fish poisoning (HFP) is a foodborne chemical intoxication caused by the consumption of spoiled, or bacterially contaminated, fish. Fish species associated with HFP are harmless when caught. They may still have a normal appearance and odour after they have become toxic. Spoiled 'fresh' fish, and frozen and smoked fish and canned fish products have all caused the disease.

HFP occurs worldwide. Recent reports in the literature have suggested that it is a significant public health and safety concern. Its true incidence has probably been underestimated, because of under-reporting and misdiagnosis owing to confusion with symptoms of other illnesses, particularly food allergy.

Histamine, a physiological amine involved in allergic reactions, is the main toxin involved in HFP, but HFP is not uncomplicated histamine poisoning. Although the disease is generally associated with high levels of histamine (≥50 mg/100g) in spoiled fish, its pathogenesis has not been elucidated.

The involvement of histamine as the main hazard in HFP is supported by: symptoms identical to those of intravenous histamine administration or allergic reaction; the efficacy of antihistamine therapy, and the presence of increased levels of histamine in spoiled fish that cause the syndrome.

Histamine production in fish is related to the histidine content of the fish, the presence of bacterial histidine decarboxylase (HD), and environmental conditions. Bacterial decarboxylase enzymes acting on free histidine and other amino acids in the fish muscle form histamine and other biogenic amines. Fish of the family Scombridae, notably tuna and mackerel, contain abundant amounts of histidine and are most commonly implicated. However, many species, both scombroid and non-scombroid (eg mahi-mahi, bluefish and sardines), have caused HFP so the term scombroid fish poisoning is a misnomer.

The main bacteria responsible for histidine decarboxylation and HFP are members of the family Enterobacteriaceae. Specific bacteria present in the marine environment or introduced during food handling produce HD, which converts histidine to histamine, particularly when fish are not kept chilled or frozen.

The most common symptoms of histamine poisoning are cardiovascular – flushing, urticaria, hypotension and headache. Other symptoms are gastrointestinal – abdominal cramps, diarrhoea and vomiting – and neurological – pain and itching associated with urticarial lesions. However, HFP is usually a mild disease of quick onset (several minutes) and short duration (about 8 h). It responds well to antihistamine treatment.

Since 1970, most reports of HFP have come from Japan, the US and Great Britain. Outbreaks have been reported less frequently in various other countries, including Australia and New Zealand. There are only two reports of HFP in Australia in the scientific literature. Juvenile Western Australian salmon caught in South Australian waters were responsible for two outbreaks, affecting a total of seven people; and two people were affected by eating a tuna meal at a restaurant in Brisbane. The true incidence of HFP in Australia is unknown.

Scombroid fish that cause HFP include mackerel, tuna, saury and bonito. Non-scombroid fish that cause HFP include mahi-mahi or dolphin fish, sardines, pilchards, anchovies, herring, marlin and tailor or bluefish. Other non-scombroid species, Western Australian salmon, sockeye salmon and Cape yellowtail, have also been implicated.

Although histamine is not solely responsible for HFP, levels of histamine in suspect fish serve as an important indicator of bacterial contamination, and many countries have set guidelines for maximum permitted levels. The current level for histamine in fish in the Australian Food Standards Code is 100 mg/kg. However, concentrations of histamine within a fish are extremely variable, as is the threshold toxic dose.

The severity of the clinical response depends on the amount of toxin(s) ingested and the variation in individual susceptibility. In some outbreaks the morbidity rate may reach 100%. There is large variation in individual susceptibility. Certain dietary components and medications such as isoniazid, aminoguanidine and some antihistaminic drugs increase susceptibility. Disease states, such as allergies and mastocytosis, may also affect the clinical manifestation of HFP.

Post-catching contamination with HDB may occur aboard the fishing vessel, at the processing plant, in the distribution system (fresh and frozen fish), and at the level of the user, for example in a restaurant. The key to the reduction of histamine production is the rapid cooling of the fish after catching.

If fish are subject to elevated temperatures, even for short periods, a large microbial population is established. During subsequent refrigeration, although bacterial growth ceases, residual enzyme activity continues slowly and histamine levels continue to increase. If the fish are then hot smoked or canned, the heat will destroy the residual microflora and HD, but not histamine.

Ongoing random monitoring of imports and domestic product by the Australian Government Analytical Laboratories (AGAL) has revealed only a small percentage of samples with >100 mg/kg histamine. The only remaining tuna cannery in Australia, Port Lincoln Tuna Processors Pty Ltd, South Australia, monitors histamine levels in all batches of fish entering the cannery, as well as in finished product, to ensure that strict food safety standards are maintained.

In developed countries where HFP still occurs quite frequently, such as the United States and Japan, most outbreaks are the result of consumption of fish caught by recreational fishers, with insufficient knowledge of the problem and without proper chilling facilities on fishing boats.

Great progress has been made in ensuring the quality of fish products despite the huge expansion in trade in recent years. This is the result of the introduction of international standards in food hygiene and the application of risk analysis and Hazard Analysis and Critical Control Point (HACCP) principles. Although incidents of HFP caused by high levels of histamine in canned tuna have occurred all over the world, improvements in handling and processing associated with the establishment of quality control procedures are now widespread and taking effect.

HFP does not have a major impact on human health in Australia, partly because fish does not form a large part of the diet of most Australians. However, the disease is important from the food safety aspect and it is possible that toxic products, particularly imports, will escape the random monitoring safety net from time to time. Consumers are becoming more demanding and litigation following food poisoning incidents is becoming more common. Producers, distributors and restaurants will increasingly be held liable for the quality of the products they handle and sell.

If a major outbreak of HFP were to occur in Australia, as has happened in Japan and the United States, resulting media attention would affect fish consumption and have a negative impact on the marketing of seafood. An outbreak in another country caused by Australian exports would seriously affect trade. Although such events are becoming increasingly less likely because of the widespread adoption of HACCP analysis and quality assurance, constant monitoring is necessary to allow for factors such as equipment failure, human error or negligence.

There is a need for global standardisation of histamine detection methods, and laboratory accreditation and proficiency testing, if histamine is to remain the main indicator of microbial spoilage in histidine-containing fish. From an environment health perspective, a rapid and cheap assay for detecting histamine in fish would be of value if made available to the public and, in particular, to recreational fishers.

Reporting of suspected cases of HFP to local food authorities should lead to removal of contaminated fish from the marketplace and prevention of additional cases. Mechanisms should be put in place, where these are not present already, to allow efficient and complete traceback of incriminated fish to point of origin, in order to rectify problems leading to spoilage. In addition, there needs to be education of recreational fishers and the public about the need for good refrigeration and hygiene to minimise the possible hazards of consuming fish.

Snapshots from needle and syringe programs in the NT

Jan Savage, CDC, Darwin, Sue Fielding, Manager, ACOCA, Alice Springs and Charles Roberts, formerly Coordinator of Healthy Injecting in the NT (HINT, needle and syringe program), NTAC, Darwin

Introduction

This article will provide a summary and analysis of data collected from the two major needle and syringe programs (NSP's) in the Northern Territory (NT). The data relates primarily to demographic features and patterns of injecting drug use (IDU). The problems of IDU use relate to patterns of use, modes of injection and associated lifestyle. NSP's aim primarily to decrease the risk of transmission of blood borne viruses (BBV) such as HIV, hepatitis C (HCV) and hepatitis B (HBV) as well as providing education and referral for injecting clients.

The NSP at the Northern Territory AIDS Council (NTAC) collects a minimum dataset on all clients who use the service. Four more detailed surveys (Snapshots) have been conducted over periods of one to two weeks, since October 1997. These surveys examined injecting behaviour and demographic features more closely. The AIDS Council of Central Australia (ACOCA) conducted their first Snapshot over a four week period in July/ August 1999.

Aim

The purpose of the surveys was to provide better and more targeted harm minimisation services to the clients of these services by defining the demographics, patterns of IDU and opportunities for safer behaviour.

Methodology

A convenience sample of all clients who attended the NSP during each period was used. Clients were asked to complete the questionnaire, administered by the staff of the NSP on a one-to-one basis.

Results

The results are summarised in the following Tables; columns I-IV refer to the Snapshot surveys conducted at NTAC in October 1997 (the Wet),[1] July 1998 (the Dry),[2] October 1998 (the Wet)[3] and October 1999 (the Wet)[4] and at ACOCA in July/ August 1999.[5] The information collected in each Snapshot from NTAC is fairly consistent, however a few items were not collected each year; NA (not available) indicates this in the tables. There is a slightly greater variation between the NTAC and ACOCA data.

Table 1 Demographics

		I	II	III	IV	ACOCA
Response rate (%)		98/202 (48.5)	129/238 (54)	121/242 (50)	104/172 (61)	50/113 (44)
Age (years) all clients (%)	<25	31	27	24	29	NA
	25-35	38	37	39	29	
	>35	32	36	36	48	
Age (years) respondents (%)	<25	34	26	35	31	30*
	25-35	35	34	32	31	68*
	>35	32	40	33	36	2*
Gender - all clients (%)	male	77	79	82	78	NA
	female	23	21	18	22	
Gender - respondents (%)	male	71	78	75	76	72
	female	26**	22	25	24	28
Residential status -resident for more than 6 months (%)		78	85	93	93	66
Indigenous - I status (%)	Non-I	92	86	87	85	90
	I	8	14	13	15	10

* 30% were aged 25 years or less, 68% were 26-49 years, 2% were over 50 years

** 3% defined themselves as transgender

Table 2 Drug use

		I	II	III	IV	ACOCA
Duration of use (%)	< 4 years	19	16	20	18	20
	4-10	35	36	36	31	40
	> 10	46	48	45	51	40
Frequency of use (%)	≥ daily	59	66	68	84	48
	weekly	35	29	28	15	42
	< weekly	6	5	4	<1	10
Drug of choice (%)	heroin	72*	57	NA	51	54
	morphine		9		9	2
	methadone		1		-	-
	speed	5	21		22	29
	steroids	6	2		<1	4
	marijuana	4	5		5	-
	other	15	5		12	10**
Drug last used (%)	morphine	67	74	72	59	24
	speed	11	14	19	24	32
	methadone	6	3	<1	3	-
	heroin	12	2	6	13	36
	steroids	4	2	2	<1	4
	other	-	5	-	-	4

* This figure is for all opiates – heroin, morphine, codeine, methadone.
** Rounded off, not equal to 100%.

Most of the results for the variables in Table 1 were fairly constant. The average response rate was just over half (52%). Of the Darwin clients (including survey non-participants) 27.5% were aged less than 25 years and 79% were male. Of the Darwin survey participants 31% were less than 25 years and 30% of Alice Springs participants were 25 years or under (note slight difference in classification). Survey participants in Darwin and Alice Springs were 75% male. Fifteen percent respondents identified themselves as Indigenous. The vast majority of participants (88%) had been resident in Darwin for at least six months, whereas in Alice Springs only 66% had.

Referring to Table 2, nearly half (47%) of those surveyed had been injecting for more than 10 years and 90% had been injecting drugs for more than 4 years with 67% using at least once a day (Darwin – 70%, Alice Springs – 48%). A small proportion had not used in the last month. Heroin was the preferred drug in 59% of all NSP users surveyed, followed by speed in 18%. There was little evidence of recent cocaine use. In Darwin morphine was the "drug last used" most commonly (69%); in Alice it was heroin (36%). Speed was generally the second most frequently used drug (19% overall) in both towns, while heroin use in Darwin fluctuated throughout the surveys. Steroid use was minimal (2%).

Table 3 Safe injecting behaviours in last month

		I	II	III	IV	ACOCA
Use of new equipment (%)	always	62	80	79	89	NA
	mostly	31	14	12	9	
	≤ half	1	<1	5	<1	
	not last month	6	5	4	<1	
Use of syringe after another (%)	never	89	97	96*	92	54
	1-2 times	6	<1		3	30
	3-5 times	4	<1		3	2
	> 5 times	1	2		2	14
	NR**					
Someone using after self (%)	no-one	89	95	NA	92	NA
	one person	11			5	
	> one				1	
	NR**				2	
Disposal (%)	return	55	47	NA	61	NA
	other	44	48		22	
	potentially unsafe***	1	6		17	

* Remaining clients had not injected in the past month. ** NR = No response. *** Domestic or public rubbish bin.

Table 4 Blood borne viruses

	I	II	III	IV	ACOCA
HIV % tested	81	89	90	92	82
HIV % positive	6	5	8	4	0
HCV % tested	88	87	88	89	80
HCV % positive	53	47	37	38	33
HBV % with history	33	NA	19	12.5	6
HBV % vaccinated	47	NA	41	37	44

Table 5 Drug treatment programs*

		I	IV	ACOCA
Participated in program(s) (%)	Yes	52	52	20
	No	48	48	80
Methadone programs (%)	Yes	33	30	20
	No	67	70	80
Wish to stop injecting (%)	Yes	NA	63	34
	No			

* Data only available from Snapshots I, IV and ACOCA

The majority of those surveyed (see Table 3) always used new equipment (78%), did not use after others (93% in Darwin and 89% overall) and did not share used equipment (92%) – incomplete data. The data on disposal was incomplete, however 82% of equipment was safely disposed of and return rates averaged 54% (Snapshots I, II and IV).

The majority (88%) of participants had been tested for HIV (see Table 4) with 5% reporting being seropositive. Similarly 87% were tested for HCV, however 41% of those reported a positive result and 18% reported a history of hepatitis B (in Alice Springs it was much lower). Nearly half (42%) reported having been vaccinated against HBV.

Overall, 46% of all respondents had participated in a drug treatment program; however only 20% had in Alice Springs. Twenty six percent had participated in methadone programs, with fewer again in Alice Springs. Slightly over half (52%) of those surveyed expressed the desire to stop injecting drugs (see Table 5).

Discussion

The transmission of BBV - HIV, HCV and HBV is a health risk associated with IDU, independent of the pharmacological effects of the substance. The risk of transmission of BBV is reduced by the use of sterile injecting equipment.

Harm minimisation is a strategy which takes into account the variety of risks associated with particular activities, but recognises that if the actual activity is unlikely to cease, then efforts should be made to decrease its negative impact. The National Drug Strategy is based upon principles of supply reduction, demand reduction and harm reduction.[6] NSP's are an example of this: illicit drug use is recognised as occurring and as likely to continue, but its harm can be reduced. Sterile injecting equipment is provided to minimise one related risk, that is, diseases spread by shared equipment. These programs also provide information and education, support, advocacy and referral for injecting drug users. There are over 3 000 NSP's across Australia.[7]

It is estimated that NSP's in Australia prevented 3,000 cases of HIV in 1991, saving over $266 million.[8] Approximately 4.5% of all cases of HIV have IDU as a sole risk factor in Australia (this excludes multiple risk factors, for example, male homosexual contact and IDU)[9] and this is 4% in the NT.[10] In the US, which does not have comprehensive NSP's, nearly half of the 41,000 new cases notified annually occur in injecting drug users, their sex partners and their children.[11] In contrast to HIV, the rates of HCV are high in injecting drug users. It is estimated in Australia that

65% of all cases of HCV have IDU as a risk factor.[12] The risk of HCV infection increases with duration of IDU.[13,14]

In the NT, the major needle and syringe outlets are in Darwin at NTAC and in Alice Springs at ACOCA, distributing over 400,000 and 20,000 needles and syringes respectively each year. Secondary outlets are provided through district Centres for Disease Control (CDC, Territory Health Services) and some emergency departments of district hospitals. Fitkits (which are pre-packaged kits containing needles, syringes, swabs and information) are sold in pharmacies.

The data collected through these surveys provides a guide to the clientele of the services and their injecting behaviours. The relatively low response rate may bias the results, however in Darwin, the Snapshot participants are similar demographically to all NTAC clients for the survey period. Information is not available on sample representativeness from ACOCA. The findings may not be generalisable to the injecting drug using population of Darwin and Alice Springs or the remainder of the NT IDU who do not access these services. It is apparent from these surveys and the increasing demands for injecting equipment, that Darwin and Alice Springs are little different from other urban or provincial centres across Australia in the extent of their residents' reported drug injecting activity.[15]

Demographic features were relatively constant across the surveys. With respect to age, approximately 31% were under 25 years. Anecdotally, a very small proportion of this group was under 18 years.[16] This is an area for concern and further evaluation as people under 18 years are known to be injecting drugs, but are not directly accessing sterile equipment from these services and therefore may not be injecting safely.[17] In keeping with patterns of NSP, and IDU use in other states, the majority of respondents were male (74.5%). Nearly 90% of clients using the Darwin NSP were defined as longer term residents, with the lower proportion in Alice Springs (66%) possibly reflecting the tourist trade at that time of year. Somewhat surprisingly, seasonal change did not have an impact on the residential status of Darwin's clientele. The proportion of clients identifying as Indigenous (Aboriginal and Torres Strait Islander) remained fairly stable at 14.5%. In Darwin the Aboriginal population is estimated to be 10.1%,[18,19] whilst in Alice Springs it is 18.5%.[18,19]

A high proportion (82%) of clients in both Darwin and Alice Springs had been injecting for a substantial period (more than 4 years); this was stable over the two years that the surveys were conducted in Darwin. Overall 66% of respondents used at least daily, although there was a difference between Darwin (69%) and Alice Springs (48%). Most participants were regular users, while 3% had not used in the last month. Heroin was overwhelmingly the preferred drug in both Alice Springs and Darwin, with speed (amphetamine) the second most popular drug. However, for "last drug used", heroin was used by 8% in Darwin in contrast to 36% in Alice Springs. This reflects a difference in supply, which is then reflected in the high use of morphine in Darwin as a heroin substitute. Speed use in Alice Springs is nearly double that of Darwin, though this appears to relate to regional preference in contrast to local supply. This amphetamine preference has been found in another study of rural IDU in Victoria.[19]

It is apparent that there is a high level of safe injecting and generally safe disposal. Obviously, clients of a NSP are self selected for safe behaviours, however at NTAC there appears to be a trend towards increased use of "new equipment always" for the period of the surveys. In the last month 78% of Darwin respondents reported always using new equipment. Overall, only 11% reported using a needle and syringe after another person. This was higher in Alice Springs (46%) than Darwin (7%). The discrepancy between the proportion of people using always "new equipment" (77%) and those who "never use after others" (86%) is most likely due to re-use of an individual's equipment by that person exclusively. Although the data on disposal is incomplete, there may be a trend towards less safe disposal. However, the increase in potentially unsafe disposals seen in Snapshot IV probably results from loss of specificity in the survey for this item. This should be better defined in future surveys and addressed by providing targeted education and ensuring that adequate disposal units are accessible.

A relatively high proportion of clients had been tested for HIV and HCV. Seropositivity rates for HCV were considerably higher than HIV (41% vs 5%), although HCV was lower and HIV higher than what would have been expected on national figures (1998 data 49% and 1.5% respectively).[9] Rates for both BBV were lower in Alice Springs. The rates of reported histories of HBV infection show wide variation. Slightly under half of all clients had been

vaccinated for HBV, however there were no further details and protective immunity was not confirmed. This is clearly an area where further education and the possible integration of clinical services to provide BBV testing, counselling, immunisation and referral need to be considered.

The data on involvement in drug treatment programs is limited but indicates that over half of those responding to the surveys would like to affect a change in their drug using behaviour. In Darwin, 52% of respondents (data from Snapshot I and IV only) reported that they had participated in drug treatment program(s). The frequency of program entry, type of program and location were not specified. The lower proportion of participants in Alice Springs may reflect (relative lack of) service availability. Slightly over one third of the Darwin participants had entered a methadone program; all Alice Springs drug program participants had experience with methadone programs (and possibly others, though this is not specified). The data on "desire to stop injecting" is incomplete but identifies that over half of those surveyed wished to stop. There is no information on the type of service they consider could support them in this.

The information collected in these Snapshots provides a very valuable basis for review and modification of both NSPs provided by NTAC and ACOCA. Specifically recommendations have been made about methods to decrease sharing and increase safe disposal. In Darwin, the provision of a limited on site, clinical service for testing and vaccination was planned to coincide with the next survey. The need for services for young people should be investigated further.

References

1. A Snapshot of HINT Clients. Characteristics of Health for Injectors in the Northern Territory Clients over a Two Week Period. NTAC. March 1998.
2. Snapshot II: the Dry. Characteristics of Needle Exchange Clients During the 1998 Dry. NTAC. August 1998.
3. Snapshot III: the 1998 Wet. Characteristics of Needle Exchange Clients During the 1998 Wet Season. NTAC. December 1998.
4. Snapshot IV: the 1999 Wet. Characteristics of Needle Exchange Clients During the 1999 Wet. NTAC. December 1999.
5. A Snapshot of Injecting Drug Using Clients of the AIDS Council of Central Australia. ACOCA. 1999.
6. Ministerial Council on Drug Strategy (1998). National Drug Strategic framework 1998-199 to 2002-2003. Building Partnerships: A strategy to reduce the harm caused by drugs in our community. Commonwealth of Australia, Canberra.
7. Dolan K, Topp L, Mc Donald M. NSP. 1999. Needle and Syringe Programs: a review of the evidence. Commonwealth of Australia, Canberra (in press).
8. Hurley S, Jolley D. Kaldor J. 1996. The effectiveness and cost effectiveness of needle and syringe programs. In Hurley S and Butler JRG (Eds), An economic evaluation of aspects of Australian AIDS/ STD Strategies. Canberra: Australian Government Publishing Service.
9. HIV/AIDS, Hepatitis C and Sexually Transmissible Infections in Australia Annual Surveillance Report. 1999. Ed National Centre for HIV Epidemiology and Clinical Research. UNSW. Sydney.
10. NT AIDS/STD Program, Territory Health Services, Darwin, NT.
11. Lurie P & Drucker E. An opportunity lost: HIV infections associated with lack of a national needle-exchange program in the USA. *Lancet* 1997; 349: 604-608.
12. Crofts N et al. Spread of bloodborne viruses among Australian prison entrants. *BMJ* 1995; 310: 285-288.
13. Crofts N et al. HCV infection among a cohort of Victorian injecting drug users. *MJA* 1993; 159: 237-241.
14. Crofts et al. Blood-borne virus infections among Australian injecting drug users: implications for spread of HIV. *Eur J Epidemiol* 1994; 10: 687-694.
15. Aitken C et al. Injecting drug use and blood-borne viruses: a comparison of rural and urban Victoria, 1990-1995. *Drug Alcohol Rev* 1999;18: 47-52.
16. Personal communication: NTAC former NSP coordinator.
17. Personal communication: NTAC and ACOCA staff, Danila Dilba Youth Project Officer.
18. Australian Bureau of Statistics. Population by Age and Sex, Australian States and Territories. Catalogue No 3201.0. Canberra ABS 1997.
19. Australian Bureau of Statistics. Experimental Estimates of the Aboriginal and Torres Strait Islander population. Catalogue No 3230.0. Canberra ABS 1998.

Letters to the Editor are welcome

NT Hepatitis C Enhanced Surveillance

Karen Dempsey, CDC, Darwin

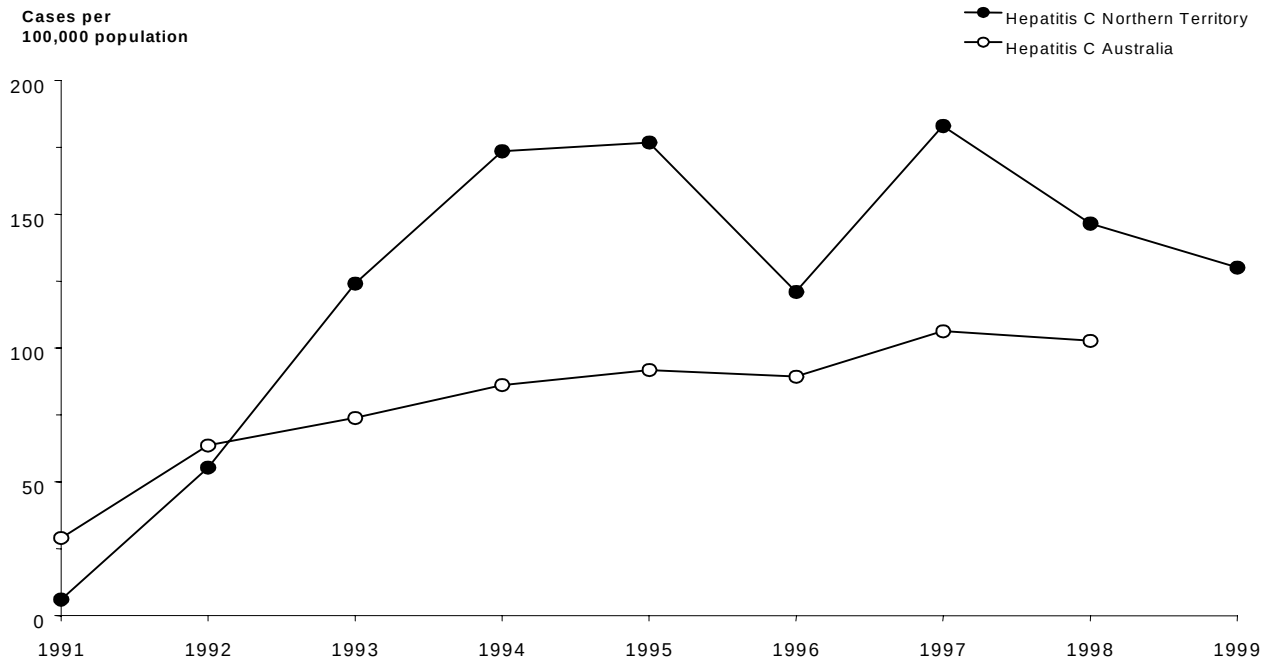
Better information for improved prevention programs and clinical planning. Your help required.

Hepatitis C virus (HCV) is classified as a notifiable disease in all Australian States and Territories. In the Northern Territory (NT) notifications of HCV positive serology are received by the Centres for Disease Control (CDC) in each district and recorded on the Territory Health Services Notifiable Diseases Surveillance System. Data is then routinely reported to the National Notifiable Disease Surveillance System (NNDSS). The data items currently collected are standard demographic information such as age, gender, Indigenous status and residence. No other information is collected other than whether the case has been confirmed or not.

All states and territories routinely report HCV notifications to NNDSS but to date there has been little coordination in the type of surveillance of HCV. Some states report only for incident cases while others provide varying levels of data on prevalent cases.[1] In 1998, a committee of state and territory representatives with experience in HCV surveillance was established to develop and implement a strategy for improved HCV surveillance. A key outcome of the committee has been the establishment of a protocol for notification of cases which provides a core set of information for all notifications of HCV.

The AIDS/STD program of the CDC has put together a pilot system to collect information on all NT HCV diagnoses. There are about 300 cases of HCV notified throughout the NT annually, the majority diagnosed in Darwin.[4] To provide better support for prevention programs and clinical services, the AIDS/STD program has decided to perform a risk factor assessment on all cases, ie acute (newly acquired) and prevalent (existing) for an initial period of twelve months, commencing 1 July 2000.

The NT has the highest rate of HCV notification in Australia. The present NT rate, which is a mixture of prevalent and incident data, is 40% higher than the national rate.[4] It is not possible to determine exactly what proportion of the NT rate is acute and what is prevalent. Little is known about current risk factors for HCV in the NT. Work carried out by Dr Doug Lush in 1994 demonstrated that among a group of HCV positive clients, 60% reported injecting drug use (past and present) as a risk factor.[3] Injecting drug users are very likely to be the group at most risk in the year 2000.



Source: Northern Territory Notifiable Diseases Surveillance System and the Communicable Diseases Intelligence National Notifiable Diseases Surveillance System. NSW and South Australia included in the Australian rate for the first time in 1997.

NT Hepatitis C Enhanced Surveillance - Starting 1 July 2000 (see flowchart page 22)

Hepatitis C is reported to the CDC by the diagnosing laboratory. Laboratory notifications do not supply enough information to discriminate between incident and prevalent cases. For this information, the participation of the diagnosing doctor/nurse practitioner is needed.

Upon laboratory notification of a confirmed positive HCV result, the AIDS/STD program will send an enhanced surveillance form to the ordering doctor/ nurse practitioner. Based on analysis of previous notifications, most cases are detected through non-GP services eg in 1999 prison entry screening (20%) and Clinic 34 (6%). Of the remaining 73%, most cases were diagnosed by general practitioners (GPs) in Darwin, at an average of two to three cases per GP per year.[4] There are exceptions but, in general, few GPs diagnosed more than this.

The surveillance form is designed to provide the basic core data set required for the NNDSS and additional data of relevance to the NT. First, the diagnosing doctor/nurse practitioner is asked to record demographic details: the first two initials of the first name and surname (needed to distinguish multiple notifications), date of birth and/or age, gender, Indigenous status, country of birth, type of occupation and length of time spent in the NT.

Secondly, the diagnosing doctor/nurse practitioner is asked to distinguish whether the case is an incident or a prevalent case. Under the definition currently endorsed by Communicable Diseases Network Australia and New Zealand, a case of acute HCV is defined on the basis of documented seroconversion to HCV when the most recent negative specimen was obtained within the last 12 months.[1]

Thirdly, the diagnosing doctor/nurse practitioner is asked to provide information on risk factors. While most practioners take a history of risk factor behaviour prior to taking a HCV test, the information asked on the surveillance form is quite extensive and may require a more detailed risk factor history at the next consultation following the test. This information, which will often relate to multiple types of risk factors, includes an estimation of time since the client was exposed to the risk factor.

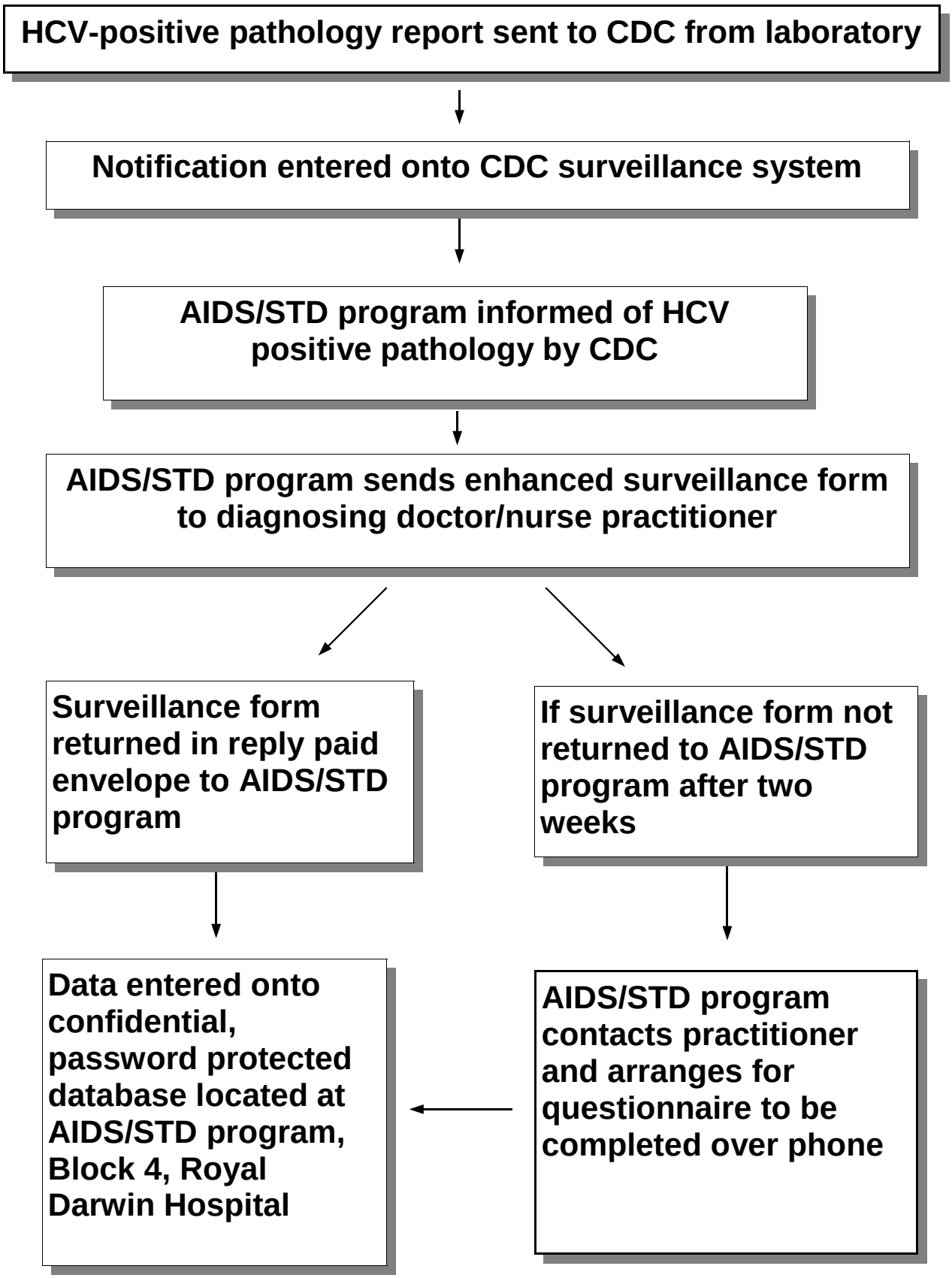
In some instances, it may not be possible to provide all of the information requested in the surveillance form, particularly if the client does not return to the clinic after the test was taken. No further follow-up will be undertaken at this stage of the trial and all we ask is that the form is returned to the AIDS/STD program.

The NT already has a much higher rate of death due to chronic liver disease than the rest of Australia, being at least 3 times the national rate, most of which is attributed to chronic alcohol abuse.[2] Cirrhosis, chronic liver failure or hepatocellular carcinoma are also long term sequelae of HCV, and the HCV Virus Projections Working Group (1998) estimate that 3-11% of people progress to cirrhosis 10 to 24 years after initial infection.[1] On the basis of this projection, the current high rates of HCV infection in the NT will add to increased morbidity and mortality due to chronic liver disease. Recent studies have found that HCV-positive persons have low liver-related morbidity and mortality rates suggesting that healthy HCV-positive persons may be at less risk for progressive liver disease than is currently thought.[5] Given that such disparate estimates exist, effective surveillance of HCV is needed to estimate the impact on the population in the near and distant future. Moreover, knowledge of the risk factors is needed to guide the planning and targeting of prevention programs aimed at reducing the incidence of HCV.

References

1. Australian Hepatitis C Surveillance Strategy, 1999. Hepatitis C Surveillance Committee. Communicable Diseases Network Australia New Zealand.
2. Dempsey KE & Condon JR, Mortality in the Northern Territory 1979–1997, Darwin: Territory Health Services, in press.
3. Lush D, Hepatitis C. Disease Control in the Northern Territory 1996; MAE bound volume:180–214.
4. Northern Territory AIDS/STD program, Darwin.
5. Seeff LB, Miller RN, Rabkin CS et al. 45-year follow-up of hepatitis C virus infection in healthy young adults. *Ann Intern Med* 2000; 132(2):105–111.

NT Hepatitis C Enhanced Surveillance



Lyssavirus prevention update

Nan Miller, CDC, Darwin

Territory Health Services implemented a lyssavirus pre and post-exposure prophylaxis program in 1996. Occupational groups whose work brings them into regular contact with bats are encouraged to receive pre-exposure vaccination. Cost of the vaccine is met by the employer or the individual.

Booster doses of rabies vaccine are recommended for immunised persons who have ongoing exposure to bats in the following manner:

- blood test for rabies antibody titre every 2 years **and**
- booster with one dose of rabies vaccine if titre is less than 0.6 IU/ml.

Post exposure prophylaxis (PEP) includes rabies immunoglobulin and 5 doses of rabies vaccine over a 28 day period. PEP should be initiated within 48 hours of exposure.

The table below shows the number of individuals who received: pre or post-exposure prophylaxis; blood test for rabies antibody titre (two years after pre exposure vaccination); and number that required a booster in 1999 by occupation.

All PEP was the result of scratches incurred while individuals were trying to free bats caught in fences. None were due to bites and none of the bats were behaving abnormally. The reason for no pre-exposure vaccinations is that most registered bat handlers and Territory Wildlife Park, Parks and Wildlife and Department of Industry and Fisheries staff have received pre-exposure prophylaxis in previous years.

Remember, the best protection against bat lyssavirus is to **NOT HANDLE BATS** and to call Parks and Wildlife on 8999 4536 if you are concerned about a distressed bat. If a bat scratch or bite is incurred seek medical attention immediately. For more detailed information contact the Centre for Disease Control in your district.

Table Number of individuals who received: pre or post-exposure prophylaxis; blood test for rabies antibody; and number requiring boosters by occupation in 1999

Occupation	Pre-exposure prophylaxis (no.)	Post-exposure prophylaxis (no.)	Antibody titre 2 years post vaccination (no.)	Booster 2 years post vaccination (no.)
Bat handler (private)	0	1	2	0
Territory Wildlife Park	0	1	9	1
Fruit picker	0	1	NA	NA
Other or unknown	0	5	NA	NA
Museum	0	0	2	0
TOTAL	0	8	13	1

Flying fox alert!

Jan Bullen, CDC, Katherine

Of great concern at present is the number of flying foxes in Katherine. They are currently breeding along the riverbank and around the hot springs, bringing them into close proximity to the residential area. With the usual influx of visitors into Katherine at this time of the year, there is increasing possibility of contact.

During the breeding season the flying foxes remain in the same location for several months and while there is usually no intentional interaction with humans, one may be tempted to pick up sick or injured animals. Bats should not be handled and Parks and Wildlife Services should be called on 8999 4536 to assist or deal with the bats. Their staff will have appropriate handling material and also have had pre-exposure vaccinations against lyssavirus.

When a person is bitten or scratched, the first dose of post exposure prophylaxis (PEP) is given but delayed for up to 48 hours if the bat can be tested for evidence of lyssavirus infection. The bat, if available, should be sent to The Australian Animal Reference Laboratory in Geelong in Victoria to test for evidence of lyssavirus infection. If the bat tests negative for the lyssavirus, subsequent PEP injections are not required.

Any orientation/education programs for health staff and those given by eg Parks and Wildlife and museums should include advice about not handling bats. Any sick or injured animals should be collected by Parks and Wildlife Services.

Summary of acute post-streptococcal glomerulonephritis in the Top End of the NT

Thérèse Kearns, CDC, Darwin and MAE program, NECPH, ANU, Canberra

As of 20 June 2000, 43 cases of acute post-streptococcal glomerulonephritis have been recorded on the Northern Territory Notifiable Diseases Surveillance System. The outbreak commenced in April 2000 and so far has affected 12 different Top End communities. To date, a total of 8 community interventions (1 community had 2 interventions) have been implemented (see Table below).

Guidelines for the Control of Acute Post-Streptococcal Glomerulonephritis produced in August 1997 were used to implement the community interventions. This outbreak in April/May/June was preceded by an outbreak on Bathurst Island in January/February this year with 3 confirmed cases resulting in a community intervention that covered 93% of the 0-15 year old population.

Guidelines for the Control of Acute Post-Streptococcal Glomerulonephritis can be accessed via the Disease Control Bulletin Board or at the following Territory Health Services intranet address: http://internal.health.nt.gov.au/publich/cdc/cdc.htm. Alternatively, contact CDC on 8922 8044.

Location	No. of Communities	No. of Cases	No. of interventions
East Arnhemland	7	27	5
Darwin Rural	3	12	3
Katherine District	2	4	0

Points to note regarding notifications on page 25

- Amoebiasis, Australian Encephalitis (MVE, Kunjin, Kokobera), Botulism, Brucellosis, Chancroid, Cholera, Congenital Rubella Syndrome, Congenital Syphilis, Diphtheria, Gastroenteritis, Haemolytic Uraemic Syndrome, Hepatitis C (incidence), Hepatitis D & E, Hydatid Disease, Leprosy, Lymphogranuloma venereum, Measles, Poliomyelitis, Typhus, Typhoid, Viral Haemorrhagic Fever and Yersiniosis are all notifiable but had "0" notifications in this period.
- The increase in the number of Cryptosporidiosis cases in the Alice Springs region may be a consequence of the recent floods. Large volumes of surface water, some of which may have become contaminated, were potential sources of infection. Additionally, increased awareness of the risk may have encouraged more testing of faecal specimens.
- The marked increase in cases in Dengue in year 2000 (all acquired outside of NT) reflect Darwin's interaction with East Timor as the great majority are acquired in East Timor with 2 or 3 from Indonesia.
- Similar variations in quarterly Hepatitis C (prevalence) notifications have been noted in the past, without any obvious reason such as increased testing due to heightened community awareness or health professional education campaigns. The annual total of Hepatitis C (prevalence) in the NT appears relatively stable. Please note these figures represent newly diagnosed, not necessarily newly acquired cases.
- The increased cases in Malaria in year 2000 reflect the activity and interaction in East Timor. 5 cases were East Timor acquired.
- The increase in TB in year 2000 reflects an increase in TB in supposed 'people smugglers' now in prison and in increased cases in one Top End and one Central Australian Aboriginal community.

NT NOTIFICATIONS OF DISEASES BY DISTRICTS
1 JANUARY TO 31 MARCH 2000 AND 1999

DISEASES	ALICE SPRINGS		BARKLY		DARWIN		EAST ARNHEM		KATHERINE		TOTAL	
	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999
Acute Rheumatic Fever	0	1	0	2	0	2	0	0	0	1	0	6
Adverse Vaccine React.	0	0	0	0	8	0	0	0	0	0	8	0
Arbovirus infections												
Barmah Forest Virus	0	0	0	0	1	8	0	2	1	2	2	12
Dengue	0	0	0	0	63	5	0	0	0	0	63	5
Ross River Virus	0	0	5	6	63	85	6	6	20	10	94	107
Campylobacter	19	26	2	0	20	41	1	2	10	5	52	74
Chlamydia	98	71	7	3	71	63	17	21	20	23	213	181
Chlamydia Conjunct.	0	1	0	0	12	3	1	0	1	23	14	27
Cryptosporidiosis	41	21	3	0	15	4	1	0	6	7	66	32
Donovanosis	3	1	0	0	0	0	0	0	2	0	5	1
Glomerulonephritis	0	0	0	0	4	0	0	0	0	3	4	3
Gonococcal Disease	151	124	14	4	33	86	15	32	30	57	243	303
Gonococcal Conjunct.	4	0	0	0	0	0	0	0	0	0	4	0
Haemophilus Inf type b	0	2	0	0	0	0	0	0	0	0	0	2
Hepatitis A	7	0	0	1	13	12	0	1	4	0	24	14
Hepatitis B	0	0	1	2	1	3	0	0	2	2	4	7
Hepatitis C (prevalence)	3	9	1	0	26	79	0	1	2	3	32	92
HIV infections	0	0	0	0	2	1	0	0	0	1	2	2
HTLV-1	4	6	0	3	0	0	0	0	1	0	5	9
Influenza	0	-	0	-	2	-	6	-	2	0	10	-
Legionnaires Disease	0	0	0	0	0	0	0	1	0	0	0	1
Leptospirosis	0	0	0	0	0	0	0	0	0	1	0	1
Listeriosis	3	0	0	0	0	0	0	0	0	0	3	0
Malaria	2	0	0	0	11	3	0	0	0	0	13	3
Melioidosis	2	0	0	0	15	26	1	0	4	4	22	30
Meningococcal Infection	2	2	0	0	0	0	0	0	0	0	2	2
Mumps	0	0	0	0	1	0	0	0	0	0	1	0
Pertussis	2	0	0	0	0	2	0	0	0	0	2	2
Pneumococcal Disease	9	14	0	0	0	6	0	1	2	0	11	21
Rotavirus	10	25	6	4	18	42	44	24	5	6	83	101
Rubella	0	0	0	0	0	3	1	0	0	0	1	3
Salmonella	31	20	4	3	51	83	6	10	21	24	113	140
Shigella	12	14	0	1	5	17	8	8	1	1	26	41
Syphilis	20	16	2	27	20	18	2	21	12	12	56	94
Trichomonas	96	-	6	-	53	-	79	-	62	-	296	-
Tuberculosis	3	1	0	0	12	3	0	0	2	2	17	6
Total	**522**	**354**	**51**	**56**	**520**	**595**	**188**	**130**	**210**	**187**	**1491**	**1322**

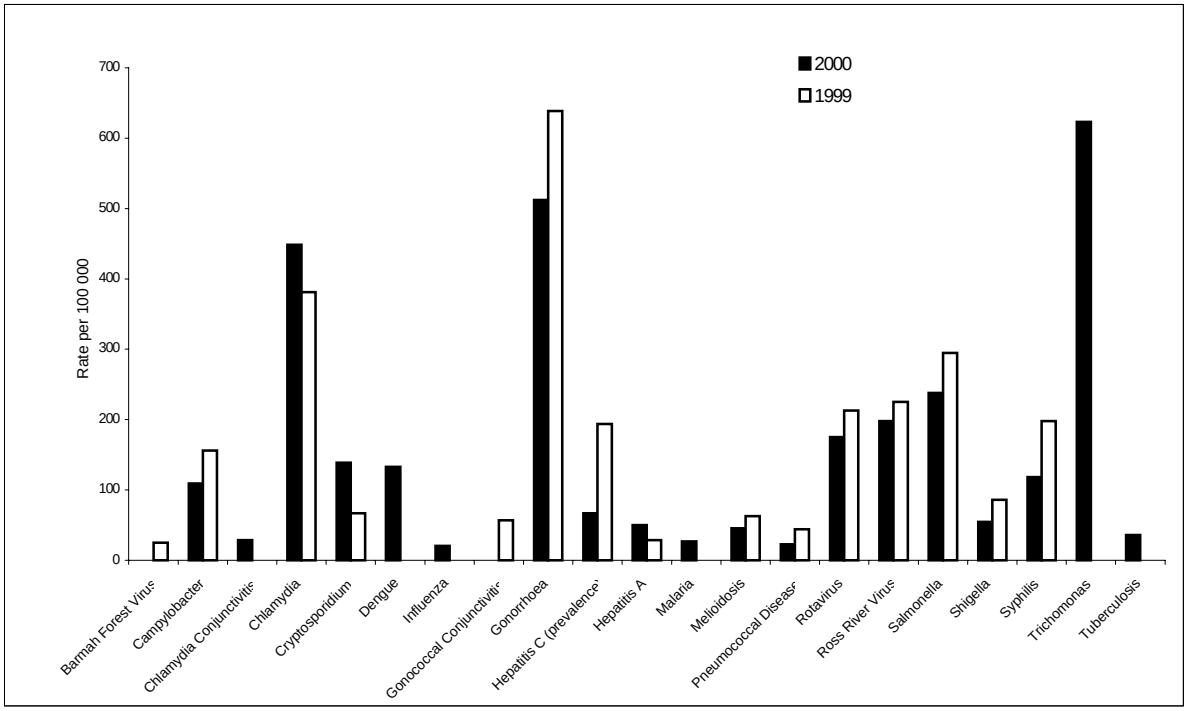
Notification of Infectious Diseases - Telephone: 8922 8044 Fax: 8922 8310

NOTIFIED CASES OF VACCINE PREVENTABLE DISEASES IN THE NT BY REPORT DATE 1 JANUARY TO 31 MARCH 2000 AND 1999

DISEASES	TOTAL		No. cases among children aged 0-5 years	
	2000	1999	2000	1999
Congenital rubella syndrome	0	0	0	0
Diphtheria	0	0	0	0
Haemophilus influenzae type b	0	2	0	2
Hepatitis B	4	7	0	0
Measles	0	0	0	0
Mumps	1	0	0	0
Pertussis	2	2	1	1
Poliomyelitis, paralytic	0	0	0	0
Rubella	1	3	1	0
Tetanus	0	0	0	0

- Mumps is largely under-reported.

NT WIDE NOTIFIABLE DISEASES 1 JANUARY TO 31 MARCH 2000 AND 1999



Rates <10/100 000 not listed
NT est. resid. pop - 189 987 supplied by Epidemiology & Statistical Branch, THS

NT MALARIA NOTIFICATIONS - JANUARY TO MARCH 2000

Merv Fairley, CDC, Darwin

Nine notifications of malaria were received for the first quarter of 2000. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemoprophylaxis was used.

ORIGIN OF INFECTION	REASON EXPOSED	AGENT	CHEMOPROPHYLAXIS	COMMENTS
PNG	Visit	*P. falciparum*	Yes	Diagnosed RDH
PNG	Visit	*P. vivax*	Yes	Diagnosed KDH
PNG	Work	*P. vivax*	Yes	Diagnosed ASH
Indonesia	Holiday	*P. falciparum*	Yes	Diagnosed RDH
Indonesia	Holiday	*P. falciparum*	No	Diagnosed RDH
East Timor	Work	*P. falciparum*	Yes	Diagnosed RDH
East Timor	Work	*P. falciparum*	Yes	Diagnosed RDH
East Timor	Work	*P. falciparum*	Yes	Diagnosed RDH
Africa	Work	*P. ovale*	Yes	Diagnosed RDH

Staff Updates

Darwin

In May, **David Peacock** commenced a 12 month appointment as Head of Surveillance. He has recently completed his specialist training in Public Health Medicine. For his MPH, he examined the fairness of the New Zealand public health system from an economic perspective. Prior to arriving in the NT from New Zealand, David has worked in occupational health, health management and infectious disease control. Apart from monitoring the incidence and prevalence of notifiable diseases, David will be reviewing the computer systems in CDC and assisting with the upgrade of the notifiable disease system itself.

After almost 18 years in Darwin, **Sara Noonan (Freund)** is heading down to the gully winds of Adelaide. Sara trained as a nurse at the Royal Darwin Hospital in the early 1980's and has spent the last eight years working in public health (including three years in the Marshall Islands). For the last two and a half years she has coordinated the Top End Rheumatic Heart Disease Control Program at CDC, and she hopes to continue in the public health field in South Australia. Any professional connections from the Top End to Adelaide will be pursued gratefully!

Tennant Creek

Following the recent departure of Elizabeth Carey, **Robin Freeman** has taken over the role of Public Health Nurse in Tennant Creek. Originally from Tasmania, Robin gained post graduate A&E experience at The Royal Melbourne Hospital before heading up to the desert for a 12 month period in 1997 to work with Ngaanyatjarra Health Service. She has lived in Tennant Creek since January and says she is enjoying the challenges of her new public health position.

NT Disease Control Conference

The annual Disease Control conference is being held in Katherine this year, September 5-7 inclusive. Sessions will cover paediatrics, TB and leprosy, lifestyle/chronic diseases, STDs and other communicable diseases. Submissions for papers are requested for all topics except paediatrics. Please contact Dr Jan Bullen on (08) 8973 9042 for more information.