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Melioidosis can occur in Central Australia after heavy rainfall

Marilyn Hassell[1], Michael Pearson[2], James Burrow[1], Nicholas Anstey[1]
Division of Medicine, Royal Darwin Hospital[1], and Tennant Creek Hospital[2]

A man living and working in Tennant Creek has presented with neurological melioidosis thought to be acquired in this area. This has occurred in the setting of recent unusually heavy rainfall, at-risk behaviour for contracting melioidosis, and risk factors for the disease.

A 60 year old man was transferred to Royal Darwin Hospital (RDH) after presenting to Tennant Creek Hospital with right upper and lower limb weakness and numbness, unsteady gait and intermittent diplopia. He had had vomiting and fevers for two days prior to presentation. He had a history of type 2 diabetes mellitus controlled with oral hypoglycaemic agents, but was otherwise well. He drank two to four beers per night, and was a non smoker.

Four weeks prior to presentation, he had a large splinter injury to the right thumb which became secondarily infected and was slow to heal, with a persistent skin defect seen at presentation. He also had water exposure while staying at his hobby farm, which had been flooded during heavy rainfall 2 weeks prior to presentation. He had waded into a duck pond to retrieve a pump from 60cm of muddy water 3 days prior to presentation. The farm had no goats, sheep or camels (animals particularly susceptible to melioidosis), but goats were reportedly present 12 years earlier. Two days prior to his presentation he had assisted with the installation of a pump which was required at the tourist mine tunnel after it flooded. He had had multiple previous visits to Darwin, the most recent being a

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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

May trip to the Top End of the Northern Territory 10 months previously with no known inoculating event or illness.

At presentation to RDH, the man was febrile (39°C). Neurologically, he was orientated with a clear sensorium. There was a partial right Horner's syndrome and gross vertical nystagmus in all directions of gaze, but no ophthalmoplegia. The lower cranial nerve examination revealed bulbar weakness on the right. There was right upper limb pyramidal weakness, reduced reflexes in the right upper limb, and upgoing plantar responses bilaterally. There was significant truncal ataxia. The Tennant Creek chest Xray was normal. A cranial CT scan with contrast was normal. He had a neutrophilia of 13.2 $x10^9$/L. C-reactive protein was raised at 220mg/L.

Eight hours following presentation to RDH, he had a respiratory arrest, necessitating intubation and ventilation, and was transferred to the intensive care unit. He was commenced on intravenous Meropenem 1g 8 hourly and Cotrimoxazole 320/1600mg 12 hourly for presumed neurological melioidosis.[1] A lumbar puncture was performed which exhibited a raised CSF protein of 1.27g/L (0.15-0.45), and CSF white cell count of 81 $x10^6$/L, 10% neutrophils and 90% mononuclear cells. Two days later, CSF culture from enrichment broth grew *Burkholderia pseudomallei*, confirming the diagnosis of neurological melioidosis. Melioidosis serology was weakly positive (IHAT titre 1:40). One week after admission, he continues to require mechanical ventilation.

Melioidosis is generally stated to occur between 20°S and 20°N latitude.[2] Although Tennant Creek is 19.6°S, melioidosis has not previously been thought to occur in the Tennant Creek area. To our knowledge only 1 previous case of melioidosis has been seen from Tennant Creek, a 1970 case of pulmonary melioidosis that was thought at the time to have been reactivation of infection acquired in South-East Asia during World War II. In this case, the recent heavy rainfall in the area, a portal of entry and extensive water contact by the patient in the presence of pre-existing diabetes mellitus are all strongly suggestive of recent acquisition of infection rather than reactivation from latent infection acquired in the Top End. This case follows that of a 21 year-old from Kintore (23.3°S) in Central Australia with idiopathic pulmonary haemosiderosis (and no reported travel history to the Top End) who died of *Burkholderia pseudomallei* bacteremic pneumonia following heavy rainfall in December 1999.[3] These cases suggest the organism *Burkholderia pseudomallei* is present in soil in these normally arid regions, and that disease can be caused in those with risk factors for the disease (diabetes, alcoholism, chronic lung disease and renal failure)[4] following unusually heavy rainfall.

It is important that health professionals are aware of the presence of *Burkholderia pseudomallei* in Central Australia, and following heavy rainfall consider melioidosis in the differential diagnosis in patients presenting with pneumonia, skin infections, fever and prostatic symptoms, fever and neurological symptoms, and sepsis.[4] A selective medium for *Burkholderia pseudomallei*, Ashdown's Broth can be used for skin lesion, sputum and throat swabs to increase the chance of isolating the organism. Top End empirical treatment protocols for pneumonia and sepsis (see December 2000 *NT Comm Dis Bull*)[5] have been temporarily introduced at Tennant Creek Hospital for the remainder of this wet season, and in future should be considered elsewhere in usually arid regions of the Northern Territory following unusually high rainfall.

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GP registrars in CDC, Darwin

Simon Morgan, RACGP Training Program and Paul Kelly, CDC, Darwin

Introduction

There are currently 41 registrars participating in the Royal Australasian College of General Practitioners (RACGP) Training Program in the Northern Territory (NT). About one third of these are based in hospitals, with the remainder of registrars based in supervised general practices throughout the Territory. Prior to 2001, there were no formal training placements in public health, despite excellent training opportunities existing in several areas.

In the last few months of 2000, a training package for a GP registrar to gain experience in communicable disease control was developed. The project represents a fruitful collaboration between the RACGP training program and Territory Health Services (THS). Similar positions are available in several states for public health trainees. To our knowledge, this is the first time such a training opportunity has become available for GP registrars.

Method

To fulfill the requirements of the RACGP, a competency based, practical and clinically based training programme was envisaged. Consultation with stakeholders in CDC Darwin took place in September and October 2000. Section heads were asked what was available in their areas that would constitute useful training for a GP registrar and what was feasible to achieve in a 6 month placement.

A number of possible models were developed, including full time, part time (as part of a hospital based infectious diseases term) and sessional (1 or more sessions per week). To strengthen the appreciation of the population health strategies, clinical sessions were to be complemented with non-clinical sessions. For this pilot project, external funding was not available. It was decided that existing funding could only cover 1 session per week over a 6 month period. Because of this limited scope to the project, it was decided that the registrars should concentrate on communicable diseases.

As part of the preparation phase, a needs assessment was undertaken. Areas that were identified included:

1. An orientation package for registrars prior to commencement at CDC.
2. Development of learning objectives and methods of assessment, including a formal pre and post-placement test, criteria for clinical assessment and a workbook.
3. Development of a training guide and timetable.
4. Areas of research interest of CDC section heads which registrars could participate in during their time in CDC.

Information about the placement was sent to all registrars. For ease of implementation, a registrar from the general practice linked to the RACGP Training Program was chosen to participate in this pilot project.

Results

The first registrar commenced in CDC Darwin in January 2001. The final model of training is shown in the table.

Table. Model for GP training in CDC.

Item	Sessions
Orientation	1
TB/Leprosy Clinics	9*
STD Clinics	10*
On call roster	6

* First clinical session in each area is conducted with a designated supervisor. The final session includes a clinical assessment.

Tuberculosis (TB) and sexually transmitted diseases (STD) clinics form the bulk of the experience. Other learning opportunities include: immunisation provider course, a session with women's cancer prevention, participation in the

on-call roster (with scope for participation in outbreak investigations), laboratory experience (in microbiology and fine needle aspiration techniques) and prison health.

There have been advantages also for CDC including the development of a generic orientation package and updates and improvements to the CDC web site.

A 2 week fulltime placement for a rural GP is planned in the next few months.

Discussion

"Population Health and the Context of General Practice" is 1 of the 5 overarching domains of general practice, as described in the RACGP Training Program curriculum. Public Health is also one of the core components of that curriculum. There has been a strong recent trend at the Commonwealth level to increase GP participation in population health initiatives.[1] A Joint Advisory Group (JAG) has been established by the Commonwealth Department of Health. Participants include members of 2 national bodies ie the National Public Health Partnership representing public health practitioners the General Practice Partnership Advisory Council representing general practitioners. The range of initiatives have included consultations with stakeholders, research initiatives, trials of practice based incentive payments for population health initiatives in general practice and the educational initiatives. In the NT, THS has initiated discussions with GPs through Divisions of General Practice and a THS policy on partnerships with general practitioners is being developed. Menzies School of Health Research has been involved, in collaboration with the Top End Division of General Practice, the RACGP Training Programme and CDC Darwin, in the development of an infectious diseases training module for clinicians.[2] Both of these local initiatives are linked to the national JAG agenda.

The practical nature of the training package developed for CDC Darwin, while not specifically linked to this national strategy, compliments the aim of improving GP participation in population health. The advantages to both CDC and the registrar are clear. For GPs training in the NT, the importance of communicable diseases and public health approaches to their control are perhaps more obvious than some other settings. From the CDC viewpoint, the existence of a wider network of GPs with knowledge of communicable disease control, skills in the diagnosis and management of infectious diseases and an attitude of cooperation and communication with their local Disease Control Unit will enhance CDC's capacity to achieve its aims and improve health in the NT.

Future plans of the project include:

1. An article in a subsequent edition of this bulletin by the registrar.
2. An exploration of an expansion of the programme to include registrar placements in other regions.
3. Identification of funding sources for longer placements, including full time and part time options.
4. Inclusion of non-communicable disease training within CDC.

For further information, contact Simon Morgan at RACGP, phone (08) 8922 7944 or email to simon.morgan@racgp.org.au

Acknowledgements

Thanks to Dr Vicki Krause and staff at CDC for their support of the project, to Dr Andrew MacDonald for releasing his registrar for 1 session per week and to Dr James Read for agreeing to be the first participating GP registrar.

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Are we overdoing syphilis retreatment?

Steven Skov, Medical Officer, AIDS/STD program, CDC, Darwin

When you treat someone for syphilis, repeat the RPR on the day of the first needle, even if it is only a few days after the diagnostic test.

If you do, you will reduce the amount of follow-up needed and the number of people who may need re-treatment.

When you are treating someone for syphilis, the protocol in the current Central Australian Rural Practiioners Association (CARPA) Standard Treatments Manual recommends that you do an RPR on the day of the first Bicillin LA injection.[1] This is especially important in the Top End and central Australia for two reasons:

1. Syphilis is common.
2. In early syphilis, RPR titres can rise very quickly.
3. There are very often significant delays between when blood is taken to make the diagnosis and when treatment is actually begun. Two studies in central Australia found delays of 42-50 days.[2,3]

In deciding whether there has been an adequate response to treatment, we are looking for at least a two titre or fourfold fall in the RPR after treatment (e.g. 1:32 down to 1:8 or less).[4] Because the RPR in early syphilis changes rapidly, the RPR at time of treatment may well be quite different to that at the time of diagnosis. Therefore it is possible that we will get it wrong if we use the RPR at time of diagnosis for this purpose. For example, consider the following scenario in the box below:

01/01/99 Well person's screen	RPR 1:4 TPHA positive	Last RPR 1:1 one year ago Diagnosis: syphilis of <2 years duration: needs 1 x BLA
01/02/99 Treatment	RPR 1:64	BLA given
01/08/99 Follow-up blood	RPR 1:16	

If we did the RPR on 01/02 at the time of treatment then we would see that there had been a two-titre fall between treatment and follow-up (1:64 to 1:16) and therefore an adequate response to treatment.

However, if we did not do the RPR at the time of treatment, we would have to use the RPR on 01/01 to compare to the one on 01/08. In this instance, we would see a rise of two titres and conclude either a treatment failure or a re-infection requiring re-treatment with 3 x BLA and further follow-up.

The question is whether this strategy results in better management sufficiently often to justify the taking of an extra blood test. This system was trialed in central Australia recently and a preliminary report published in the CARPA Newsletter.[2] Follow-up over a 12-month period showed that in 88 cases of syphilis there was a difference between the diagnosis RPR and the treatment RPR of one titre in 30 of the 88 cases and of two titres in 8 cases (unpublished data). Having the treatment RPR result (as opposed to just the diagnostic RPR) changed the management in 10/88 cases. The benefit for these 10 patients was that response to treatment was considered adequate and they did not need another 3 BLAs or further blood tests at 6 and 12 months after re-treatment as would have been necessary if there had been no treatment RPR.

In primary and secondary syphilis the RPR can change very rapidly. It is possible that an RPR could be 1 or even 2 titres higher within a week (personal communication, Dr. Gavin Hart).

Therefore, even if treatment is started only a few days after the diagnostic blood test, the RPR should still be repeated.

The current protocol has been in place over the last 3 years. However, the impression of the

CDC's and Sexual Health Unit's is that very few bush staff are following this aspect of the protocol. We urge everyone involved in treating patients for syphilis to take blood for syphilis serology on the day treatment is started. The advantages of doing so are that it reduces unnecessary follow-up and re-treatment for patients and is less work for the clinic staff.

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Non-Communicable Diseases Update. Diabetes: New diagnostic criteria and NT AusDiab results

Tarun Weeramanthri, Community Physician, CDC, Darwin

New diagnostic criteria for diabetes, based on WHO recommendations, have been widely adopted in Australia since mid-1999.[1] The main changes are as follows:

1. A single fasting venous plasma glucose level of ≥ 7.0 mmol/L is now diagnostic of diabetes, if symptoms of diabetes are present (e.g. thirst and polyuria). The previous diagnostic level was ≥ 7.8 mmol/ L. In the absence of symptoms, 2 readings of ≥ 7.0 mmol/L are necessary. This lower fasting value fits better with abnormal readings on the 'gold standard' diagnostic test for diabetes, which is the oral glucose tolerance test (OGTT).

2. A new 'pre-diabetes' category of Impaired Fasting Glucose (IFG) has been created, defined as a fasting level between 6.1 – 6.9 mmol/L. People falling into this category are not necessarily the same individuals as would be identified as having Impaired Glucose Tolerance (IGT) following an OGTT.[2] IGT is another form of 'pre-diabetes'. Patients with 'pre-diabetes' (whether IFG or IGT) have a greater risk of cardiovascular disease than others, as well as a higher risk of developing overt diabetes.[3]

To identify all cases of diabetes and IGT , one should perform an OGTT on all patients with fasting plasma glucose of 5.5 – 6.9 mmol/L, as previously recommended. This may or may not be practical. An alternate approach would be to evaluate individuals with IFG for other risk factors for cardiovascular disease (hypertension, obesity, physical inactivity, hyperlipidemia, micro or macro-albuminuria) and retest after 1 year.

A new classification of diabetes has also been adopted (Type 1, Type 2, Gestational and Other), with the terms IDDM and NIDDM not now recommended.[4] NHMRC endorsement of new guidelines on case detection and diagnosis, incorporating the above changes, is lagging behind the change in practice, and is still pending.[5]

The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) is the first attempt to determine the prevalence and impact of diabetes and related conditions across Australia. Designed and executed by the International Diabetes Institute in Melbourne, with funding from a variety of sources, the Northern Territory (NT) component took place in Darwin last year with support from Territory Health Services, Diabetes Australia (NT) and the Menzies School of Health Research. 1461 adults aged 25 years or over from the Darwin and Palmerston areas were tested, and data analysed using the new diagnostic criteria.[6] The total age and gender standardised prevalence of diabetes in the NT sample was 5.0%. For every known case of diabetes, there were approximately 1.4 newly

diagnosed cases. The overall prevalence of 'pre-diabetes', either IGT or IFG, was 14%. Therefore, 19% (or 1 in 5) adult Territorians had either diabetes or 'pre-diabetes'. High rates of obesity, dyslipidemia and hypertension were also found.

AusDiab data from New South Wales, Victoria, Western Australia and Tasmania reveals an overall diabetes prevalence of 7% in those states, with another 16% having 'pre-diabetes'. So, overall, the prevalence of diabetes and 'pre-diabetes' was slightly lower in the Darwin population, but still of concern. It was not possible to estimate the prevalence of diabetes in the Indigenous population from this study, though planning for an 'Indigenous AusDiab' is underway (Professor Kerin O'Dea, personal communication).

The adoption of the new diagnostic criteria, and increased emphasis on screening will result in greater numbers of people with diabetes and 'pre-diabetes' being identified in primary care.[7] Such individuals will need counselling and effective support to modify their risk of complications, including cardiovascular disease. It should be remembered that the relationship between fasting glucose and cardiovascular mortality is probably continuos without a clear threshold– the higher the fasting level, the greater the cardiovascular mortality.[8] The cost-benefit balance from testing will depend not just on the numeric level chosen as diagnostic, but on the resources and systems available for follow up.

Key Points

- New lower fasting criterion for diagnosis of diabetes
- New category of 'Impaired Fasting Glucose'
- 'Type 1' and 'Type 2' preferred terminology
- 1 in 5 adult Territorians have either diabetes or 'pre-diabetes' on new criteria

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Leptospirosis Update

Vicki Krause, CDC Darwin

In follow up to the front page article in last quarter's *Bulletin*, "Two cases of leptospirosis diagnosed in the Royal Darwin Hospital" and the late breaking report of 3 additional women being hospitalised with the disease, the total number of leptospirosis cases notified in 2000 was 8. In addition to the 3 hospitalised women, a 4th asymptomatic woman who also had been turtle hunting with the other women was diagnosed and notified. The history and timing of these female cases suggested a point source outbreak. Two male notified cases were in duck/goose hunters and a 3rd suspected case of leptospirosis in a duck hunter who did not return for follow up was not included as the criteria for notification were not met. The remaining 2 male cases included an abattoir worker and a rural dweller with close contact to many native and farm animals. All cases were *Leptospira interrogans* serovar *australis*.

NT leptospirosis notifications from the previous years, 1991-1999 ranged from 0 to 3 per year, all being males from Katherine and Darwin areas. Within Australia, Queensland has always had the highest number of cases. Over this same period, Queensland cases ranged from 34 to 214 per year with an upward trend over the last 5 years.[1]

The disease affects people employed in a wide range of occupations and activities which traditionally have included farmers (especially banana, dairy, cane and rice), graziers, station hands, agricultural/rural workers, meatworkers, sewer workers, fish workers and military troops. It is also a recreational hazard to those campers, bathers, sportspersons eg white-water rafters, kayakers and to hunters (men and women) in infected areas.

Outbreaks, as occurred in the NT women, have been noted in those exposed to fresh water rivers, streams, canals and lakes. A recent report of an outbreak surrounding athletes participating in the Eco-Challenge-Sabah 2000, a multi- sport expedition race in Borneo, Malaysia pointed to swimming in or being associated with activities in the Segama River as the source of infection.[2]

More recently disease has been increasing in the less traditionally 'at risk' groups such as children and students and in urban populations in some countries. Children account for at least 5% of leptospirosis cases in Australia.[3] Studies in the USA prior to 1970 showed the majority of cases occurred in occupational settings while more recent studies showed 60% occurring in children, students and housewives suggesting a shift to exposure in the home or in recreational settings.[4]

The 4 female leptospirosis cases in 2000 were the first cases to be notified in women in the NT since 1991 when computerized NT records began. While historically a disease of males due to the increased exposure in male dominated 'at risk' occupations - this is changing. Widening recreational exposure and increase in household exposure through eg pets as well as rodent infestation may be contributing to this changing pattern. A recent Australian review noted a high proportion of contact with animals including 45.9% to rats, 43.3% to cattle and 36.9% to dogs.[3]

The real public health risk attributable to dogs in this zoonotic disease is unknown. The leptospirosis reference laboratory in Queensland reported in 2000 that it was unable to culture leptospires from the urine of dogs, with the only isolations coming from blood cultures.[3] More study in this area is needed. The following article, reporting the first cases of leptospirosis in dogs to be diagnosed in the NT, is therefore of great interest.

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Leptospirosis in NT dogs

Helen Parkes, Berrimah Veterinary Laboratories

During the 1999/2000 wet season, 5 dogs were diagnosed at Berrimah Veterinary Laboratories (BVL) with acute canine leptospirosis. This is the first time canine leptospirosis has been diagnosed at BVL.

History and clinical signs

The 5 cases included 3 mature female dogs, 1 six month old male pup and an 11 week old pup. One of the females was the mother of the young pup. Clinical course of disease was about 7 days or less. Two of the dogs had initial lameness or limb pain. Most had some or all of the following (based on the histories on submission forms, which are often scanty!): lethargy, anorexia, vomiting and jaundice. Two were noted to have normal temperatures (the others didn't say).

Clinical pathology

Haematology and clinical chemistry were done on 4 of the dogs at BVL. Three showed mild to moderate anaemia, with little evidence of regeneration, and 3 had moderate or marked neutrophilia, 2 with a left shift. All 4 showed markedly elevated urea and creatinine, with raised phosphorus, amylase and lipase attributable to renal failure. Three of the 4 also had moderately or markedly raised bilirubin, ALT, AST and ALP. Three had moderately raised CK.

Post-mortem findings

Two of the dogs were examined post-mortem at BVL. Both showed marked jaundice. Both had extensive haemorrhages, involving the subcutis, lungs, thymus (in the young pup) and kidney (subcapsular). Lymph nodes were dark red. One also had petechial and ecchymotic haemorrhages of the gastric and intestinal mucosa, with bloody intestinal contents.

Histopathological changes

Histological examination was done on 4 of the 5 dogs. All showed very similar changes. In the liver, there was dissociation and necrosis of hepatocytes, binucleate hepatocytes and biliary stasis. The kidneys showed acute tubular degeneration and mild, interstitial, lymphocytic infiltration in the cortex. Generalised haemorrhages, lymphoid depletion, and mild myocarditis and skeletal muscle degeneration were other changes seen. The brains of 2 of the dogs were examined and both had mild, diffuse, non-suppurative meningitis.

In 3 out of the 4 dogs examined, occasional organisms consistent with leptospires were found in the renal tubules, using a silver stain (Warthin-Starry). Note that all the dogs had been treated with antibiotics prior to death.

Serological testing

Sera from 4 of the 5 dogs were sent to the WHO/ FAO Collaborating Centre for Reference and Research on Leptospirosis, in Queensland. All 4 had antibody titres to *Leptospira interrogans* serovar *australis*. Two of these had titres of 1:200, one had a titre of 1:800 and the fourth had a titre of 1:1600. Two of the dogs also had lower titres (cross-reactions) to various other serovars, including *copenhageni*, and *bulgarica*.

Some background to canine leptospirosis in Australia

Canine leptospirosis has been recognised in Australia for many years, mainly in north Queensland. The following information comes mainly from a talk given at the annual meeting of the North Queensland branch of the Australian Veterinary Association, in September 1999. The paper is entitled "Canine Leptospirosis in North Queensland", by Richard Miller (Veterinary Pathology Services) and Stephen Ross (a practitioner from Mackay).

The most common serovar seen in north Queensland is *L. australis*, with a focus of *L. zanoni* infection on the Atherton Tablelands. Leptospires tend to have a natural or definitive host in which they are non-pathogenic, and cause disease when spread to a different, incidental host, such as the dog. *L. australis* has been isolated from various native marsupials, as well as introduced rats and mice. Contact with urine from these species may be the mode of transmission to

dogs. Wet weather and/or swampy conditions probably facilitate transmission. Direct contact, for example grabbing a rat, may also allow transmission.

Clinical signs and histories in a series of about 50 dogs, were similar to those seen in Darwin. In general, dogs initially show lethargy and anorexia, and may develop jaundice, vomiting and diarrhoea. Pyrexia is variable. As with the dogs seen at BVL, clinical pathology reveals renal failure and liver disease. There is usually a neutrophilia, often with a left shift and toxic changes. Some dogs show mild anaemia.

Pathogenic leptospires produce toxins, which cause haemolysis as well as tissue damage. The severe jaundice results from both increased production of bilirubin due to haemolysis as well as reduced ability to excrete bilirubin because of toxic and hypoxic damage to hepatocytes.

Zoonotic potential

Leptospirosis is potentially zoonotic, and can cause disease in humans. Handlers of affected dogs should ensure good hygiene, and wear adequate protective clothing. However, it would appear that dog to human and dog to dog transfer of disease is rare, and most infections, both human and canine, are acquired from an environmental source. In the cases at BVL involving a bitch and her eleven week old pup, there may have been cross-infection, or both animals may have been infected from the same primary source.

In conclusion

Canine leptospirosis in the NT had not been diagnosed at BVL before this outbreak. Since it appears that transmission probably requires a moist environment, the long wet season in 1999/2000 may have been a contributing factor.

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Darwin cryptosporidiosis outbreak December 2000 - January 2001

David Peacock, Head of Surveillance, CDC, Darwin

Introduction

Cryptosporidiosis is a parasitic infection of the gastrointestinal tract that typically presents with profuse watery diarrhoea.[1] In immunocompetent persons, the disease is usually self-limiting (many cases are asymptomatic) although symptoms can last for up to 3 weeks. By contrast, it can be a devastating illness in the immune-compromised, including those persons with AIDS. The average incubation period is 7 days (range 1 to 12 days) and the disease may be communicable for several weeks after the onset of symptoms. The parasite is normally transmitted by faecal-oral spread and, consequently, can be a particular problem in institutions such as childcare centres. Apart from preventing dehydration, treatment of cryptosporidiosis is limited.

Cryptosporidium species are intracellular protozoan parasites from the same phylum as *Toxoplasma* and *Plasmodium.*[2] The organism is ubiquitous and infects many animal species; *Cryptosporidium parvum*, however, is the only species that infects humans.

Cryptosporidia have a number of features that increase their infectivity. Firstly, they form hardy oocysts that can persist in the environment for a considerable time. Secondly, the oocysts are resistant to standard water chlorination and are too small to be captured by many water filters. Finally, the infective dose can be low; in a recent study, the median infective dose was only 132 oocysts. As a consequence, cryptosporidiosis outbreaks can be associated with both drinking and recreational water.[3,4] However, the relationship between the oocyst count in water and the incidence of disease is not well understood.[5] Nevertheless, any cryptosporidiosis outbreak raises the possibility of a contaminated water source.

In the Northern Territory (NT), the case definition for a case of cryptosporidiosis is that the person has a clinically compatible illness *and* oocysts of *C. parvum* are detected in faeces *or* life-cycle stages of *C. parvum* are detected in an intestinal biopsy specimen.

Outbreak Details

Cryptosporidiosis has only been a notifiable disease in the NT since April 1999 and nationally notifiable since 1 January 2001; evidence about the incidence of cryptosporidiosis is therefore limited. Nevertheless, as part of routine CDC surveillance, a cluster of 5 cases in Darwin was identified at the beginning of December 2000. Over the next 6 weeks, 43 cases of cryptosporidiosis from a localised area of Darwin were notified. All cases were followed up by CDC staff members.

The epidemic curve is given in Figure 1.

Figure 1: Time course of all cases

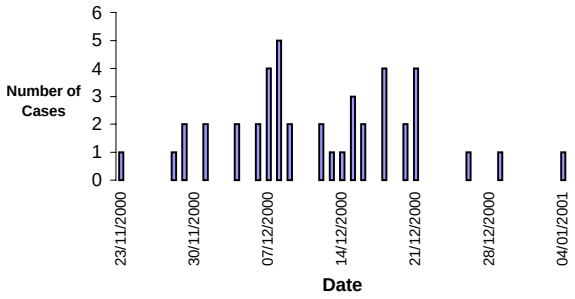


Table 1: Ages of cryptosporidiosis cases

Age (yrs)	Freq	Percent	Cumulative Percent
0	4	9.3	9.3
1	18	41.9	51.2
2	10	23.3	74.4
3	2	4.7	79.1
20 to 40	9	20.9	100.0

The age breakdown of the cases is given in Table 1 above. Of the cases, 22 (51 percent) were male and 2 were Aboriginal.

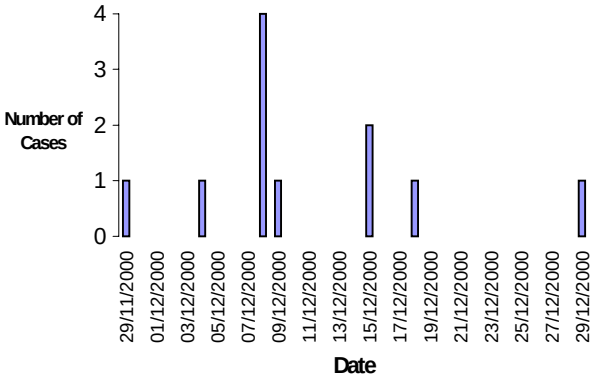
For the cases where details were available, 31 of 36 (86%) were associated with child care centre attendance (Table 2); 27 of the 31 with two centres (A and B) in adjacent suburbs.

Table 2: Distribution of cryptosporidiosis cases

Institution	Number	Proportion (%)	Number under 5 yrs
Childcare centre A	11	25.6	9
Childcare centre B	16	37.2	13
Childcare centre C	1	2.3	1
Childcare centre D	1	2.3	1
Childcare centre E	2	4.7	2
Family Day Care	1	2.3	1
None	4	9.3	1
Unknown	7	16.3	6
Total	43	100.0	34

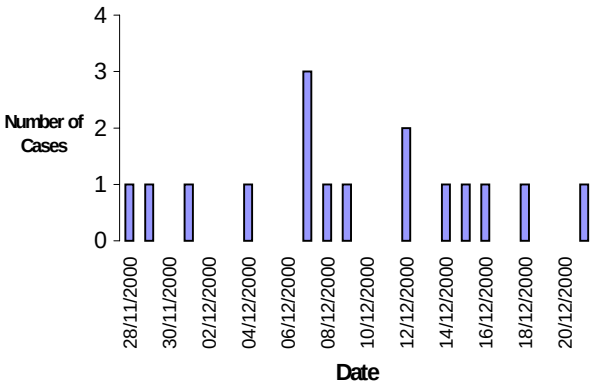
Most were children but 5 of the 9 adult cases were the parents of children who attended either childcare centre A or B. Of the remaining 4 cases, 3 had no contact with pre-school children and the status of the other is unknown. Two cases were food handlers and they were excluded from work until at least 48 hours after the first normal stool.

Figure 2: Time Course of cases associated with childcare centre A



The time course of cases associated with childcare centres A and B are given in Figures 2 and 3. Given the variable incubation period for cryptosporidiosis, it is difficult to get a precise estimate of the time of exposure. Figure 2 suggests that the early childcare centre A cases may have shared exposure to an infected point source in the last week of November with subsequent person-to-person spread. Alternatively, all cases may have resulted from person-to-person spread from an index case(s). Of course, it is not known if the first notified case was, indeed, the first case in the centre.

Figure 3: Time Course of cases associated with childcare centre B



Similar considerations apply to the cases at childcare centre B (Figure 3).

Discussion

As with all communicable disease outbreaks, the first priority is to prevent more cases. Most effectively, this can be achieved by either identifying the source of infection and removing it, or interrupting transmission, or both. An outbreak of cryptosporidiosis can result from exposure to a *point* source, such as a contaminated swimming pool; a *continuous* source such as contaminated drinking water; or occur as a *propagated outbreak* principally spread via person-to-person transmission. In the initial stages of an outbreak, it may not be possible to assign cases to one of these categories.

Investigation and control measures were instigated as soon as the outbreak was identified on 5 December 2000. The THS Environmental Health Department was immediately informed of the outbreak. Within 24 hours, childcare centre B had been inspected and advice provided on general hygiene, including the management of their wading pool.[6] In particular, all water play was to cease and the cleaning, handwashing, nappy change and food preparation practices were reviewed. Within a few days, childcare centre A and 2 others were visited and their hygiene methods reviewed.

A circular to parents of children at the A and B childcare centres advising them of the outbreak was distributed on 7 December. Shortly afterwards, doctors and Community Care Centres were informed of the outbreak. A media release generated a flurry of media interest which provided an opportunity to give public health advice and information.

A source of infection was not identified. At no stage was contaminated drinking water or a particular swimming pool implicated as the source of infection. The smouldering course of disease cases is typical of person-to-person transmission of a disease with an incubation period of several days or more. Having excluded these possibilities, public education, improved hygiene practices and enhanced surveillance are the effective control measures to be pursued. Due to the presence of hardy oocysts, and the asymptomatic nature of many infections, outbreaks of cryptosporidiosis can be difficult to control. This outbreak appears to have effectively ended; transmission may have been interrupted by the holiday closure of many childcare centres over Christmas. Nevertheless, sporadic cases of cryptosporidiosis continue to occur.

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Custom designed vaccine refrigerator trial - Julanimawu Health Centre, Bathurst Island, Northern Territory (NT)

Mark Ramjan[1] and Nan Miller[2]
Tiwi Health Board,[1] CDC, Darwin[2]

Introduction

Vaccines are biological products that lose their potency if they are not stored and transported correctly. Vaccines should be refrigerated at above 2° C and below 8° C.[1]

Two cold chain studies in the Northern Territory (NT) found that freeze sensitive vaccines were exposed to sub zero temperatures even in tropical climates, particularly during storage in standard domestic refrigerators.[2,3]

The majority of health centres in remote areas of the NT store their vaccines in modified domestic refrigerators (Figure 1). Domestic refrigerators are designed for the storage of food. They are fitted with upper and lower shelving, sliding drawers and shelving on the doors. All of these areas have varying temperature ranges, as they are designed to store specific foods. Generally the coolest area is at the top of the refrigerator and the warmer areas are at the bottom of the refrigerator and on the door shelves.

In the NT, vaccines are monitored during transport and storage with Time/Temperature monitors and Freeze indicators. The daily maximum and minimum temperature of the refrigerator used for vaccine storage is checked using an electronic, digital maximum /minimum thermometer fitted to the refrigerator. When using a domestic refrigerator for the storage of vaccines, the refrigerator is modified and vaccines stored according to recommended guidelines.[1]

The storage of vaccine in modified domestic refrigerators is not an ideal method. Maintaining optimum vaccine storage conditions is dependent on a high level of training and understanding of the staff that are responsible for vaccine management. Staff turnovers, particularly in remote/rural health centres can compromise safe vaccine storage. The aim of this trial was to determine if a custom designed vaccine refrigerator could maintain vaccine within the safe temperature range without specialised staff training or refrigerator modification.

Territory Health Services (THS), Centre for Disease Control and the Tiwi Health Board approached Arcus Australia Pty Ltd to supply a custom designed vaccine refrigerator for field trial in a remote, rural health centre. The company supplied the refrigerator at no cost for a 3-month trial period with the understanding that it would be returned or purchased at the end of the trial.

Setting

The Arcus AUD1SV vaccine refrigerator used for the trial has a storage capacity of 400 litres.
The trial model had a double glazed, clear glass door with no shelves in the door and no lower drawers. The main body had 4 shelves, internal fluorescent lighting and a built in electronic digital maximum / minimum thermometer with the readout and reset buttons at the top of the unit. The motor and fan are also located above the storage area. This refrigerator is preset by the manufacturer with operating temperatures between 2°C and 6.9°C and is controlled electronically.

The Arcus AUD1SV refrigerator was installed in the Julanimawu Health Centre pharmacy, Bathurst Island, NT on 10 August 2000 and the trial commenced the same day.

Methods

All vaccines normally stored in the modified vaccine dedicated domestic refrigerator in the same area, were transferred to the trial refrigerator.

Standard THS vaccine cold chain guidelines were followed throughout the trial. A Time/ Temperature monitor (Monitor Mark™ 10N/34AA by 3M) was placed in each vaccine storage basket within the trial refrigerator. Freeze indicators (ColdMark™ freeze indicators by IntroTech) were placed in with each type of vaccine that can lose their potency from exposure to freezing temperatures.

A separate electronic Max/Min thermometer with

external probe capable of measuring and displaying the current, maximum and minimum temperatures inside the refrigerator was fitted to the trial refrigerator. The temperature probe was positioned on the middle shelf and the digital display unit attached to the outside of the refrigerator door. This thermometer was used to record the daily maximum and minimum temperatures Monday to Friday.

A Hastings HOBO®-TEMP temperature Logger was placed in the trial refrigerator. The Hobo Logger was programmed to record the temperature within the trial refrigerator at 40-minute intervals for the trial period in 3 time blocks. The Logger was located at intervals on the top, middle and lower shelves to assess the temperatures in each area of the refrigerator. During attempts to download the recorded temperatures stored in the Logger, due to either operator or instrument error, the information was unable to be retrieved. The Logger was reprogrammed to record temperatures at 40-minute intervals and placed back in the Arcus trial refrigerator for a monitoring period of 37 days (886 hours, 1329 readings).

The trial was extended to 5 months to allow for additional logger recordings.

Results

Arcus AUD1SV Refrigerator (Figure 2). Health staff commented that the clear glass door allowed them to select the vaccines that they required prior to opening the door and this shortened the time that the door was open.

Time Temperature monitors. During the 5-month trial period, only 2 of the monitors had reached the 'A' index. All others were negative (no exposure equal to or greater than 10 degrees). The 'A' index equates to an exposure of 10°C for a total time exposure of 3 days, or 21°C for a total time exposure of 2 days. All vaccines remain potent even with index 'A' exposure.

Freeze indicators. None of the indicators had been activated. All remained clear, indicating that the vaccines had not been exposed to temperatures of -3°C (± 1°C) or below.

Electronic Maximum / Minimum thermometer. The maximum and minimum temperatures were recorded on most days, Monday to Friday. The average daily maximum temperature for the period 10 August to the 30 November 2000 was 9°C and the average daily minimum temperature was 1°C with the monitor probe positioned on the middle shelf. The temperature recorded outside of the refrigerator was 22-23° C.

Hobo -Temp logger. The logger data for the first 3 periods of 30 days each was irretrievably lost. The trial was extended to enable another try at logging the temperatures within the refrigerator. The data for 37 days beginning on 13 December 2000 and ending on 19 January was successfully retrieved. The temperature was recorded at 40-minute intervals for a total of 1,329 readings with 810 being for the centre and upper shelf and 519 for the lower shelf. The results are shown at Table 1.

Table 1. Temperature ranges recorded by the Hobo Temp logger for two zones in the vaccine refrigerator

			Temperature ranges		
Location	**Hours**	**Entries (No.)**	**Maximum (oC)**	**Minimum (oC)**	**Mean (oC)**
Centre & upper shelf	540	810	10.92	1.56	2.84
Bottom shelf	346	519	7.98	1.88	2.96
Total	886	1329	n/a	n/a	n/a

Periodic spikes in temperature were noted for each day with the average spike being between 7° to 8°C and 6° to 7.9°C respectively for the upper and lower storage zones. These temperature spikes were consistent with opening of the unit to remove or store vaccines. The latter accounted for the temperature spike to 10.92 °C in the upper zone on one occasion. It should be noted that at the next interval reading (40 minutes after) the temperature was 1.56°C suggestive of a rapid cool down after opening. This rapid cool down phase was further demonstrated when the door was opened until the built in refrigerator thermometer indicated 12°C. The door was then closed. It took

84 seconds for the internal temperature to return to 8° C.

Discussion

A custom-built vaccine refrigerator allows greater storage capacity for vaccines and better cool air circulation. There is no need to fit salt water bottles inside the refrigerator, as is required when modifying domestic refrigerators therefore eliminating unnecessary clutter. The door seals are very efficient requiring a slight effort to open the door.

The vaccine refrigerator was well accepted by staff and there were no vaccine losses due to improper storage temperatures during the trial. The unit was easy to move due to the large wheels however; this was also a minor problem when opening the refrigerator, as it could roll. Furniture castors were installed below each wheel to eliminate this problem. Since this trial began 3 more Arcus vaccine refrigerators are in use in the NT, 2 in Darwin and 1 in Tennant Creek.

It is suggested that additional trials with other custom-made vaccine refrigerators be considered, especially to trial smaller units. Once the most suitable refrigerators are identified, consideration should be given to making funds available to remote health centres to allow for the purchase of one custom vaccine refrigerator for each health centre. Vaccine refrigerators come in different sizes to accommodate a community with a small population (100 to 200), a medium size population (300-500), a medium to large population (500-1000 people) or a community with a large population (above 1000 people). However, the cost of smaller units (eg 120 L) is only about 30% less than the 400L size. A 600L is also available for larger urban centres.

The cost to purchase the Arcus AUD1SV refrigerator was $2,600 plus $260 GST plus freight and insurance costs from Perth. The total value of vaccines stored in this refrigerator at the conclusion of the trial was $3,132.92. Of these, $2,933.30 worth of vaccines were freeze sensitive and could be destroyed should they be exposed to temperatures less than 0° C.

Trials should consider using the newer generation of Hasting loggers with enhanced logging capabilities. The HOBO logger used in this trial could not be programmed to run for 37 days if shorter intervals were programmed. Shorter intervals would be desirable to establish the temperature recovery time within the refrigerator.

Clinical staff should continue to receive on-going training in the correct storage procedures for vaccines in the health centre. The THS nationally accredited 'About Giving Vaccines Course', covers storage procedures and other aspects of knowledge required by clinical staff to ensure that vaccination programs are being delivered to the highest possible standard.

Recommendations for custom made vaccine refrigerators

- Front wheel locks fitted to prevent movement of the refrigerator when opening the door.
- An operation manual. It is a necessity to have a simple operator instruction manual and a more detailed 'Trouble shooting' manual.
- In this model the adjustment control panel and factory fitted maximum / minimum thermometer readout, fitted to the top of the refrigerator were too close together. Staff became confused when trying to check the maximum / minimum temperature and pressed the refrigerator temperature control button by mistake. However, this did not change the pre-programmed temperature range.
- Temperature adjustment buttons should be located in an out of view area (eg on the rear of the refrigerator) leaving only the maximum / minimum readout and reset button easily accessed by clinical staff.

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(Figures 1 and 2 on following page)

Figure 1: Domestic refrigerator with thermal lag modification and storage patterns needed for the safe storage of vaccines.

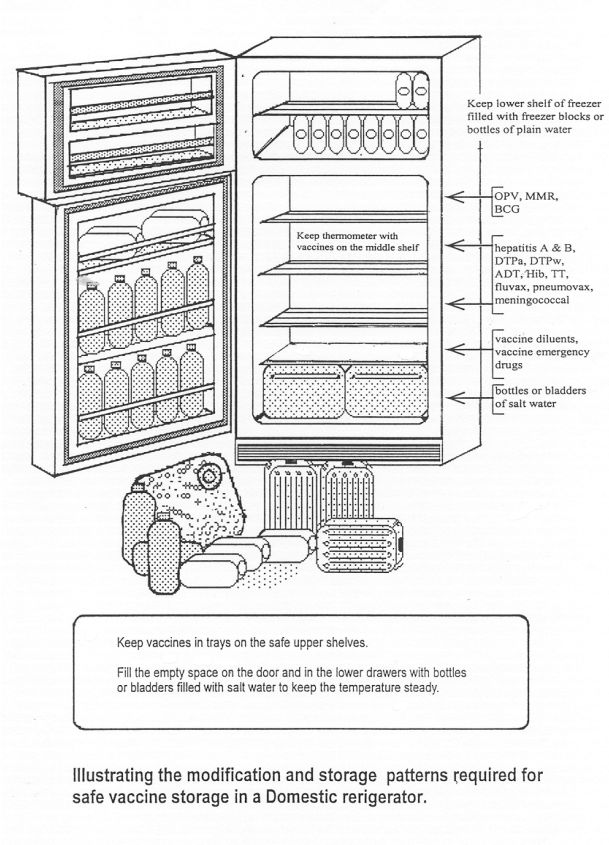

Figure 2. Arcus 400L vaccine refrigerator with double glazed glass door and motor at the bottom. (Note: the trial model, AUD1SV, has the motor unit and the built in Max/Min digital thermometer at the top).

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What's new for the prevention of invasive pneumococcal disease (IPD)?

Christine Selvey & Nan Miller, CDC, Darwin

Pneumococcal disease in infants under 2 years of age in the Northern Territory

Children in the NT have a high burden of disease caused by the bacterium, *Streptococcus pneumoniae* (pneumococcus). This organism commonly causes pneumonia, bacteraemia, meningitis and otitis media in young children.

Invasive pneumococcal disease

Invasive pneumococcal disease (IPD) is defined as illness where *Streptococcus pneumoniae* is cultured from a site that is normally sterile (usually blood or cerebrospinal fluid). Most cases present as pneumonia, febrile illness or meningitis. Now that *Haemophilus influenza* type b (Hib) infection has been eliminated following the introduction of

Hib vaccine (1993), the pneumococcus is the most important cause of meningitis in children. Past studies in Aboriginal children in Central Australia have identified the highest reported rates of IPD in the world, with an annual incidence in children aged under 2 years up to 2053 per 100 000.[1,2] This means for every 1,000 Aboriginal children aged less than 2 years in Central Australia, 20 or 21 will be admitted to hospital with IPD each year. Aboriginal children in the Top End and non-Aboriginal children in Central Australia also have very high rates of IPD with annual rates in children less than 2 years old of 326 and 218 per 100,000 respectively.[3]

Non-bacteraemic pneumonia

The incidence of IPD does not take account of the very large numbers of children who have pneumonia due to *Streptococcus pneumoniae* but where blood cultures are negative. It has been estimated that the annual incidence of pneumococcal pneumonia requiring hospitalisation without bacteraemia is about double the incidence of IPD.[4]

Ear disease

Streptococcus pneumoniae also causes at least a third of all cases of otitis media in children in the NT (personal communication – Amanda Leach). In a Top End community 100% of babies had had at least 1 episode of acute otitis media by 3 months of age.[5] The Collins report on Indigenous education in the NT identified hearing loss as a significant factor resulting in poor learning outcomes in NT Aboriginal children.

Antibiotic resistance

The NT has a higher proportion of strains of *Streptococcus pneumoniae* that are resistant to penicillin and to multiple antibiotics than is reported elsewhere.[3] This appears to be worsening.[6] Antibiotic resistance restricts the ability to effectively treat pneumococcal infections and highlights the need for prevention of these diseases.

Good news for Australian children

A pneumococcal vaccine, suitable for children less than 2 years of age, has been licensed for use in Australia. Prevenar ® (Wyeth-Lederle) is a conjugate vaccine that contains saccharides of the capsular antigen of 7 different *Streptococcus pneumoniae* serotypes.

Surveys[3,7] have shown that the 7 serotypes included in the vaccine (4, 6B, 9V, 14, 18C, 19F, 23F) are likely to cover about 58% of invasive isolates in Central Australian Indigenous children and 80-85% of invasive isolates in urban Australian children.

Prevenar ® is licensed for the active immunisation of infants and children from 6 weeks to 9 years of age against invasive disease, pneumonia and otitis media caused by *Streptococcus pneumonia*.

Presentation

Prevenar ® is a ready to use 0.5 ml suspension for intramuscular injection.

Storage

The vaccine should be stored at 2° to 8° C. DO NOT FREEZE.

Recommendations

The Australian Technical Advisory Group on Immunisation (ATAGI) has recommended Prevenar® for high incidence populations. ATAGI has defined 4 tiers of groups as high-risk of IPD 2 of which will include:

- all children under 2 years of age living in the Central Australia; and
- all Indigenous children under 2 years of age in Australia.

The ATAGI recommendation has gone to the NHMRC for final endorsement and to the Commonwealth for funding consideration. It is likely that vaccine for the high-risk groups will be funded.

Starting dates and schedule

The starting date and schedule/s for Prevenar ® have not been finalised. When the vaccine is available it is anticipated that it will be included in the standard NT childhood vaccination schedule from 2 months of age as a three-dose schedule.

A catch-up program for NT children 3-23 months

of age is also recommended and is under consideration as is a catch-up for up to 5 year olds in Central Australia.

CDC will send out up-dates, as they become available.

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Targeted screening at the Northern Territory AIDS Council October 2000

Sue Dubow, Peter Knibbs and Carole Whittles, AIDS/STD Program, CDC, Darwin

Background

Since 1995, the Collaboration of Australian Needle and Syringe Programs has conducted the Australian Needle and Syringe Program (NSP) survey (the *Fingerprick* survey) annually to monitor drug use trends and prevalence of human immunodeficiency virus (HIV) and hepatitis C virus (HCV) among injecting drug users (IDU).[1] The results of the survey are published but individual participants do not receive information on their HIV or HCV status. Throughout the week-long survey period clients attending the Northern Territory AIDS Council (NTAC) for injecting equipment are invited to participate in the survey by completing 2 anonymous self-administered questionnaires and providing a finger prick blood sample (also anonymous) for HIV and HCV testing. The survey is conducted through the Health for Injectors in the Northern Territory (HINT) program at NTAC in the Darwin central business district.

This year for the first time, Clinic 34, the HIV/AIDs/sexually transmitted disease (STDs)/blood borne virus (BBV) clinic in Darwin offered to provide onsite testing for HIV, hepatitis B (HBV), HCV, syphilis, gonorrhoea and chlamydia for clients who attended HINT during the survey week. This was the result of a recommendation from previous surveys undertaken through HINT[2] and provided an opportunity for participants to establish their BBV status, unlike the delinked, anonymous testing. It is known that IDUs access health care services less than the general population. Stigmatisation because of their injecting drug use is felt to be a contributing factor. The National HIV/AIDS Strategy 1999-2000 to 2003-2004[3] highlights the need for people using drugs to have access to appropriate treatment and support services.

Aim

The aims of this project were to:

1) pilot a screening service to a group which reportedly do not access preventative health services,
2) assess the uptake of the service in this client group,
3) assess the prevalence of disease in high risk targeted population, and
4) develop recommendations for future services.

Method

Nursing staff from Clinic 34 Darwin offered testing at NTAC for 5 hours per day on 3 days during the week the survey was undertaken.

Clients were informed that confidential, free testing for BBVs and sexually transmissible infections was available to them onsite. A brief sexual and IDU history was taken and pre-test information was given to participants.

Screening of venous specimens for HIV, HCV, HBV and syphilis as well a first void urine or tampon specimen for gonorrhoea and chlamydia was offered. Those who gave a verbal history of HBV or HCV infection, or HBV immunisation were not offered retesting. No participants self-identified as being HIV positive. The NT Hepatitis B Vaccination Policy and Public Health Management Guidelines identifies IDU as one of the "population groups at higher risk of HBV infection" for whom pre-immunisation testing and immunisation should be made available[4]. Clients were informed that Clinic 34 staff would be available to give results at NTAC on the Friday of the following week.

All specimen testing was conducted at the Royal Darwin Hospital. Abbott AxSym MEIA (microparticle enzyme linked immunosorbent assay) was used to test for HIV (HIV1/2 Go), HBV and HCV. The serological tests used to screen for syphilis were Fujirebio TPPA (*Treponema pallidum* particulate agglutination) and Pan Bio RPR (Rapid Plasma Reagin). The Roche Cobas Amplicor PCR system was used to test for chlamydia and gonorrhoea.

Results

The HINT project officer at NTAC reported that 151 clients attended HINT during survey week and 91 (60%) participated in the national *Fingerprick* survey. On the days Clinic 34 staff were present, 98 clients attended the needle and syringe program of whom 18 elected to participate in the expanded testing on offer. Of these, 16 (89%) were male, 1 (5.5%) was female and 1 (5.5%) identified as transgender giving a response rate of 18%. It is not known how many of the 98 clients participated in the national *Fingerprick* survey but of those tested by Clinic 34, 5 did not participate (personal communication, HINT Project Officer, NTAC). Client age ranged from 19 to 49 years; the average age was 39.5 years. All 18 clients gave permission for HIV and syphilis testing. HBV and HCV tests were declined by 3 (17%) and 5 (28%) people respectively on the basis of their past histories.

One third (6/18) of clients denied recent sexual activity. Half (5/10) of the sexually active male clients provided first void urine specimens (FVU) for PCR testing for gonorrhoea and chlamydia. All results were negative for both pathogens. The 1 female client was offered tampon testing by PCR for chlamydia and gonorrhoea but declined.

None of the 18 clients had a positive HIV result. One client had positive syphilis serology (TPPA positive; RPR 1:1). Of the 15 who had HBV testing, serology results indicated 6 (33%) had natural immunity, 4 (22%) had been immunised and 5 (33%) had no evidence of past infection or immunisation. There were no HBV carriers identified. Testing for HBV was declined by 3 clients who had a past history of infection or immunisation.

HBV test results in individuals who assessed themselves to be HBV negative (n=15)

Natural Immunity (HBcAb pos, HBsAb pos)	**Acquired Immunity (HBcAb neg, HBsAb pos)**	**Not immune (HBcAb neg, HBsAb pos)**
6 (40%)	**4 (27%)**	**5 (33%)**

HCV testing was carried out on 13 clients with 10 (77%) being HCV antibody negative and 3 (28%) being positive. These cases will be followed up by the AIDS/STD Enhanced Surveillance Project to determine if they are new HCV diagnoses and possibly newly acquired infection. The 2 clients with previously negative HCV serology again returned a negative test (date of prior test unknown). The 5 clients (28%) who had been diagnosed as HCV positive in the past declined repeat HCV testing.

Only 2 of the 18 participating clients sought their pathology results: one client returned to NTAC and the other telephoned Clinic 34 the following week to get results. No clients with positive results have presented for follow-up.

Discussion

The results of this very small project raise a number of issues for further consideration. The participation was sub-optimal, highlighting a need for more data before a continuing service could be

offered. One of the aims of the project was to determine the uptake of an onsite clinical/ screening service. This was low, at 18% of all HINT clients who attended on the days these services were available. Although the reasons for the low response rate to this service are unclear there are a number of hypotheses. Firstly, most clients accessing HINT spend very little time at the premises, there is an urgency to "get in and get out as soon as possible". It may be that the additional time required to complete the questionnaires and provide a blood sample deterred clients from participating further in the screening by Clinic 34. An analysis of Clinic 34 clients who completed the questionnaires and those who did not was not performed. Secondly, there was little promotion of this service and its potential benefits before it commenced. And finally, the limited time that the service was available may not have suited the clientele.

A payment of $5.00 was given to participants as an incentive to participate in the national *Fingerprick* survey. It is not known if the payment contributed to clients taking up the offer of testing by Clinic 34, however nearly one third (5/18) who were tested did not participate in the national survey nor receive any payment.

The reasons for the very poor rate of client return for results are unknown. Again, lack of promotion about follow-up or lack of clarity about the process may have contributed. The need to contact those with apparently newly diagnosed conditions is being addressed as a priority. The overall poor response raises concerns about public health issues such as contact tracing and vaccination for hepatitis B, and the opportunity to discuss harm reduction strategies, as well as the need for clinical management for syphilis and assessment of hepatitis C status. Most participating clients did not provide explicit contact details, possibly indicating concerns about confidentiality. Any follow-up activity needs to be undertaken with great care because of the potential to breach confidentiality and to compromise the credibility of any further work done through NTAC.

It is not possible to draw strong conclusions about the value of offering this service during survey week or the prevalence of disease in this high risk group. It is encouraging that no HIV was detected in this small sample and we will wait for the delinked results to be published to compare this with the larger survey group. It is less encouraging that 40% of clients possibly did not know they had been infected with a vaccine preventable disease (as they did not verbally report a history of past HBV infection). And, similarly that 33% had not taken up (or perhaps been offered) the chance to be immunised against HBV: only 27% had serological markers of HBV immunisation. In this group, new diagnoses of HCV were made in 23%, nearly half (44%) overall were HCV positive (self reported or serology). No comment can be made on the results of the screening for chlamydia and gonorrhoea (5 specimens tested – all results negative) because of the small sample size.

From the small number of people seen it is evident that:

a) There is infection (i.e. HCV and HBV) in this at-risk population.
b) There is a need (although not yet quantified) for further clinical and public health services.
c) Further screening services need to be offered in ways which better meet the needs of this high risk group particularly around follow up care and referral.
d) Service needs to be more effectively promoted on a continuous basis.
e) Protocols for testing and improved follow-up procedures need to be developed by Clinic 34 in conjunction with HINT.

Acknowledgments

The AIDS/STD Program wish to acknowledge and thank Kitty Gee (Darwin Coordinator for the National Fingerprick Survey) and the other NTAC staff for their assistance and support with this pilot project.

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Guidelines to prevent fly breeding in domestic situations in the Top End of the NT

Peter Whelan, Medical Entomology Branch, Territory Health Services

Introduction

These guidelines have been developed by the Medical Entomology Branch (MEB) of Territory Health Services to reduce domestic fly problems for householders in urban Darwin. Some aspects are also applicable for rural residents and residents of other communities in the wider NT. They are also applicable for business premises. More information on flies and their control can be obtained from the MEB or environmental health officers in various regions.

Information about flies

Domestic flies can occur in pest numbers throughout the year in Darwin, with a tendency for higher populations in the wet season, when suitable breeding materials are kept moist and soil can be more suitable for maggot entry and survival. Even small populations of flies can be annoying but more importantly they play a role in disease transmission.

Domestic flies carry and transmit disease-causing organisms in a number of ways.[1] Ways include:

- On their mouthparts
- Through their vomit
- On their body and legs
- On the sticky pads on their feet
- Through their intestinal tract by means of faeces

Diseases transmitted mechanically by domestic flies include typhoid, cholera, bacillary dysentery, infantile diarrhea, amoebic dysentery, giardiasis, pinworm, round worm, whip worm, hookworm and tapeworms.[2] Transmission of organisms such as *Salmonella typhimurium*[3] and *Shigella*[4] also occurs. Enterohaemorrhagic *Escherichia coli* have recently been shown to proliferate in houseflies and are excreted for at least three days after ingestion[5].

The housefly *Musca domestica* and the green/blue blowfly *Chrysomyia megacephala* are the most common problem domestic flies in Darwin.

The housefly breeds in a wide range of garbage and is the most likely species to cause a nuisance and lead to food spoilage inside a house. In Darwin it commonly breeds in wheelie bins in poorly packaged garbage. It breeds in prolific numbers in horse dung and moist chicken manure.

The blowfly tends to be less common inside houses but is more obvious because of its larger size and very active flight habits. It breeds mainly in meat products, other garbage with a high protein content, and dead animals. Common breeding places in Darwin include wheelie bins with unpackaged garbage, waste pet food, discarded bones, and dead rats.

Domestic flies lay eggs in moist warm decaying organic matter, such as meat and vegetable scraps, disused pet food, dead animals and animal faeces.

A female housefly can lay 4 to 6 batches of eggs of about 20 eggs each over a period of a few days. The eggs hatch in about 12 hours and the maggot stage takes about 5 days. The full-grown maggot migrates to a drier area or enters the soil to develop into a pupa. Pupae are often found in wheelie bins that have missed a collection. The pupa stage lasts about 4 days before the adult fly emerges. The development from egg to adult takes about 9 to 10 days in normal Darwin conditions. The adult flies feed on a great variety of materials such as faeces, meat, sugar, milk, or any other foodstuff. The fly vomits and deposits faeces on food and in this way can spread disease.

Blowflies can lay from 100 to 400 eggs in a single batch and the eggs hatch in about 8 hours. After hatching maggots can take as little as 3 days to mature and reach the wandering stage. Over 5000 mature maggots can be produced from 300 grams of food garbage in a single wheelie bin under Darwin conditions.[6] Wandering maggots crawl out of wheelie bins at night and then enter moist soil, where they pupate and can emerge as adults 5 to 7 days later.[6] The adult flies are attracted by smell and feed on a variety of materials such as faeces, blood, sugar, milk, or any other foodstuff.

A previous survey of wheelie bins in Darwin indicated that over 50% of bins and up to 70 % of

bins in some suburbs could be infested with maggots.[6] As wheelie bins are collected once per week in Darwin, maggots can readily develop to the wandering stage and crawl out of a wheelie bin before the next collection.

The prevention of domestic fly breeding relies on the correct treatment, storage and disposal of household garbage by the householder. The shorter the period of exposure of the garbage to flies, the less production of flies. Adult flies can readily burrow into loosely packaged garbage.

Double bagging of garbage with plastic bags can reduce blowfly production in wheelie bins by up to 600 % compared with non bagged garbage. Although double bagging can reduce blowfly production, it is important to also prevent exposure of garbage before bagging. Garbage left exposed for as little as two minutes can become full of maggots.[6] Double bagging of 300 g of waste food, including meat scraps, can reduce blowfly production from 6000 maggots in unbagged garbage to 3000 maggots after 30 minutes exposure before bagging, and to 1000 maggots after 2 minutes exposure before bagging.[6] In practice with the use of kitchen tidies and the ability of flies to quickly enter wheelie bins it is difficult to prevent exposure of garbage to blowflies.

However control of adult flies or maggots in wheelie bins can be very effectively achieved with off the shelf products such as impregnated insecticide strips or blocks.[7] The installation of impregnated pest strips in wheelie bins can kill adult flies in 30 minutes and maggots in a few hours. For effective use of pest trips, the bins should be in a sunny position and the lid left closed. If all the wheelie bins in Darwin were installed with pest strips there would be a dramatic reduction in domestic fly numbers.

Guidelines to prevent fly breeding

The following guidelines have been prepared for handling garbage and preventing domestic fly breeding under Darwin conditions. These include;

- Use a kitchen tidy bin with a sealable lid and a liner for temporary storage. Keep the tidy bin inside a screened house or in a screened area to prevent fly entry. Install a pest strip in the tidy.
- Wash out all food containers such as milk cartons, meat trays, pet food tins, plastic bags and other tins which contain residues of food before placing them in the kitchen tidy bin. Reduce all fluids in garbage as much as possible.
- Bury or collect and securely wrap or bag all uneaten pet food including old bones and place in a wheelie bin.
- Wrap all putrifiable food scraps securely in newspaper or seal them in plastic bags prior to depositing in a kitchen tidy bin. Alternatively, keep wrapped meat scraps in the freezer until bin collection day.
- Tie all kitchen tidy bin liners with a knot before depositing the contents in the wheelie bins. This will prevent fly entry and more importantly prevent fly or maggot exit.
- Ensure the kitchen tidy bin contents are placed in the wheelie bin daily and at least the day before wheelie bin collection.
- Do not place garbage in industrial bins.
- Ensure wheelie bins are placed out before scheduled collections. A missed collection can lead to fly breeding.
- Ensure the wheelie bin is not over full and the lid is closed at all times.
- Wash all bins out after collection and allow drying out.
- If you continue to have a maggot problem spray the bottom of a cleaned out bin and the inside of the lid with a residual insecticide such as Permethrin or Deltamethrin.
- Install a pest strip such as Binkill or Sureguard mini-strip inside a wheelie bin and replace the strips every two months.
- If you see a missed bin on collection day, alert the person responsible of the potential for fly breeding.

Alternate means of disposal of garbage

There are some alternatives for the disposal of garbage in certain locations or for high fly potential garbage. These are usually not as effective as securely bagging and placing in a wheelie bin with an impregnated pest strip. Alternative methods include;

- **Vegetable scraps**
  - Spread thinly over mulched areas.
  - Spread very thinly under mulched areas.
  - Bury beneath soil.
  - Place in a fly proof compost bin.
- **Meat scraps**
  - Bury beneath soil.
  - Take to the dump more regularly, perhaps in cooperation with neighbors.
  - Store separately in an airtight fly proof receptacle in a suitable area.
  - Wrap and store in the freezer before placing out in bin just before collection.
- **Pet and Animal Manure**
  - Pet faeces or fowl and horse manure should be spread thinly on or hosed into the ground, buried or bagged and placed in a bin.
- **Lawn clippings**
  - Spread lawn clippings thinly to allow drying.

Adult fly control

Many methods may be used to reduce adult flies in and around the home, including screening, air curtains, fly swats, knock down insecticides containing resmethrin or similar, fly traps, electrocution devices, and fly baits. Screening can be very effective in separating food and people from flies. The other devices are very useful inside the house in destroying those flies that enter but offer little in the way of controlling the outside population of flies. Fly traps, while useful for survey purposes, usually only harvest a proportion of the large population of flies. They do not clear a residential area of flies and offer little control. Electronic sound repellers do not work against insects and are completely useless as fly control devices.

Electrocution devices with attracting ultra violet light are excellent devices for killing adult flies in food preparation premises. They are best positioned close to fly entry points. They should be out of sight of flies outside the premises to prevent attracting flies inside. They must be well away from food preparation or consumption surfaces as dead fly debris can contaminate food.

Environmental considerations

There are many environmental considerations to take into account with garbage storage and disposal and they are listed below.

- Reduce the amount of garbage by recycling or using alternate means of disposal.
- Sealing and wrapping with paper is preferable to bagging in plastic.
- Reduce the need for plastic bagging by using alternate means of disposal of putrifiable garbage.
- Wash out bins on lawn areas rather than at the curbside where the garbage and water will lead to a problem in the gutter or storm drain outfall.
- Ants can be useful to assist maggot control but they are not a substitute for good garbage practice.
- Any oils or other environmentally dangerous chemicals and insecticides should not be put into the garbage. They end up contaminating the disposal site and surrounding environment.

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Ready for the 'killer maggot'

A story of a fearsome pest known as the screw-worm fly and our efforts to halt it in its tracks

As an adult it looks like your average blowfly, but this particular fly comes with a history and a life-cycle that makes it a living nightmare – its maggots (larvae) feed on the living flesh of warm-blooded vertebrates. It's called the screw-worm fly and it's found in many of the countries immediately to Australia's north. If it reached Australia it could wreak widespread economic havoc and misery.

Why is the screw-worm fly such a problem? What is being done to fight the screw-worm fly in countries where it occurs? How is Australia preparing for its possible (some scientists say probable) arrival? And what role does a new fly breeding facility in Malaysia have in our battle against the screw-worm fly? The answers to these and many other issues are provided in this Special Feature.

Meet the enemy

The screw-worm fly is one of the most unpleasant insect pests that humans have ever had to deal with. Not only does it attack and often kill our livestock and pets, it will also attack humans if the opportunity arises – sometimes with horrible consequences.

The screw-worm fly is an average sized, blue blowfly found throughout the tropics. What makes the screw-worm fly so damaging is that its larvae (maggots) can only survive in the healthy tissue of warm-blooded animals. In contrast, the maggots of most other blowflies, such as the Australian sheep blowfly, develop on dead animals or the diseased tissue of living hosts.

There are two species of fly involved: The Old World screw-worm fly (*Chrysomya bezziana)* and the New World screw-worm fly *(Cochliomyia hominivorax – hominivorax* is Latin for man-eater!). They're both very similar in appearance and life-cycle but they occur in different regions of the world. The Old World screw-worm is found in Africa, India and Asia whereas the New World screw-worm is found in South America and Central America.

Cycles of life and death

To give screw-worm maggots access to living flesh, female screw-worm flies lay hundreds of eggs in a tightly cemented mass on the dry edge of wounds or body openings. The eggs hatch 12 to 20 hours later and the larvae crawl into the wound or toward the host's soft, moist tissues.

Over the next week the maggots burrow deeply into the host's living flesh and grow to approximately 15 mm long and 3 mm in diameter. They appear whitish to cream in colour. Bands of dark spines grow on each body segment of the tapered worm-like maggots giving them the appearance of a screw – hence their name.

However, the real damage is done by a strong pair of mouth hooks on the maggot's head. They use these hooks to tear open tiny blood vessels (capillaries) in the flesh of the host, encouraging bleeding and feeding on the fluids produced by this wounding.

The larvae normally stay together in a tightly bunched pack while feeding – often forming a pulsating mass of hundreds or thousands of tightly packed maggots, heads down, tails up. This causes the wound, which may have been quite small to

begin with, to become progressively larger. Wounds usually emit a pungent, sickly smell.

When they are mature, the larvae wriggle from the wounds and drop to the ground where they burrow into the soil. Their skin hardens to form a protective structure called the puparium, and the larvae develop into adults. Somewhere between a week and a month later (depending on temperature), fully grown flies emerge.

Within a few days the flies mate and the females search for a suitable host on which to lay their fertilised eggs. And another cycle of misery starts anew.

While many animals survive a single, small infestation, the wound produced often serves as an entry point for further infestations. Massive invasions of the affected area by screw-worm maggots can result in extensive tissue damage, disease, debility and death.

History and hosts

Worldwide there are some 20 species of fly that infest living vertebrate tissue (a condition known as *myiasis* – derived from the Greek work *myia:* a fly) but the two most important species, in terms of economic damage and physical suffering, are the Old and New World screw-worm because of their wide distribution in tropical and subtropical areas and their ability to infest a large range of animals. Indeed, both can infest virtually any warm-blooded livestock or wildlife species within their distribution (including birds and humans). Screw-worm flies were even able to infest polar bears at the Negara Zoo in Malaysia.

Screw-worm flies have wreaked economic havoc on various livestock industries around the world. In Texas in 1935, there were 3.2 million screw-worm fly cases in cattle, and about 15% of infested animals died (a cost of $US10 million in 1935 values)! Until 1958, the cost of screw-worm flies in the United States was $US140 million a year. In 1985 the estimated annual cost of fly infestation in Central America was $US43 million and in Mexico $US156 million.

While their economic toll is massive, the screw-worm fly's ability to attack human flesh is equally horrendous and there are some nightmare tales through history of fly strikes. In the 16th century Herman Cortez, a Spanish conquistador in Mexico, branded his native prisoners on the cheek with a 'G' (for the word *guerra,* meaning war). In many cases this was a death sentence as the branding wound allowed screw-worm infestation to occur.

Prisoners sent to the infamous 'Devil's Island' (near Brazil) were also often dealt a death sentence when afflicted with screw-worm myiasis. The maggots would usually attack the moist nose area eating into the face. If 'lucky' the prisoner might just lose his nose and/or eye and experience facial scarring. If the maggots dug deeper he'd normally lose his life.

Nowadays, screw-worm infestation is not such a serious problem in the developed world but is still a significant problem in some places where there's a low standard of living with limited access to modern medicine. The native people in some parts of Papua New Guinea and El Salvador still suffer from screw-worm fly myiasis.

Fly fight back

Over the past century a number of chemicals have been used to prevent or treat screw-worm myiases, but chemicals require repeated applications and have proved difficult to apply when livestock are kept in large numbers over extensive areas. Also, the screw-worm fly's ability to infest a wide range of animals, both native and exotic, meant that protecting livestock did not deprive the pest of breeding sites. What was needed was a more comprehensive solution to the problem.

Such a solution was developed by entomologists in the United States in the 1940s and 50s. New World screw-worm fly was causing major problems for cattle producers in the southern areas of the United States and there was a strong push to come up with a solution.

Edward Knipling, an entomologist studying screw-worm fly, believed a key to the problem was the life cycle of the fly itself. While the male fly can mate with several female flies, the female usually only mates once. Edward believed that if a large number of sterile male flies were released into afflicted areas, fly populations would crash very quickly. Any female mating with a sterile male would produce sterile eggs, which would not hatch.

At about this time, new technologies for breeding

large numbers of screw-worm flies using non-living food were becoming available. A dose of X-rays at a specific growth stage sterilised the flies. These technologies meant the way was clear to test this new form of insect control known as SIRM (Sterile Insect Release Method).

The first convincing demonstration of the technique was carried out by the United States Department of Agriculture on the island of Curacao in 1954. Within 14 weeks of the program being initiated, screw-worm fly was completely eradicated from the island!

Following this success a massive SIRM program was launched over the southern United States resulting in the complete eradication of the pest in the United States by 1966 (though reinfestation continued to occur for many years and the last recorded case of screw-worm fly infestation occurred in 1982).

Attention was then turned to Mexico and countries in Central America with considerable success. The method was also used to quash an outbreak of New World screw-worm fly in Libya in the late 1980s.

The Australian threat

Neither species of screw-worm fly has ever become established in Australia. However, with the Old World screw-worm fly found throughout Southeast Asia and Papua New Guinea, the threat is ever present. If we needed any reminder about how real that threat is, we only need to consider that in Darwin in 1988, several adult Old World screw-worm flies were found in an empty livestock ship that had just returned from delivering cattle to Brunei. Old World screw-worm flies have also been found in the passenger compartment of an incoming 747 jet.

A slightly more macabre, but no less serious, incident occurred in 1992 when an Australian woman who had visited Brazil returned to Melbourne with New World screw-worm maggots in a wound in the back of her head. More than 20 screw-worms were removed, but more were discovered after she had returned to her home in NSW. Such incidents serve as an important warning that we must always be on guard.

An outbreak of screw-worm fly in Australia could prove devastating, with bio-climate models predicting that screw-worm fly might spread through our tropical and subtropical areas and, in summer, extend into the major livestock production areas of southern Australia. It's believed there would be a significant impact on livestock production and public health, with estimated costs to livestock industries close to $280 million dollars a year!

Of course, Australian quarantine authorities are always on the alert for possible screw-worm invasion. There is continuous surveillance of our northern coastline, of ports and airports, and properties and abattoirs. However, given our large coastline and our extensive livestock industry, many authorities believe that no matter how careful we are, we should plan for a screw-worm fly outbreak.

Being ready

Throughout the 1970s and '80s, CSIRO's Division of Entomology, with support from the Commonwealth Department of Primary Industries and Energy, was involved in preliminary research on the ecology, physiology and artificial mass rearing of the Old World screw-worm fly.
Following this, in the late '80s and early '90s, Commonwealth and State Government agencies, together with relevant livestock organisations, reviewed Australia's ability to deal with a screw-worm outbreak and drew up an intensified Screw-worm Preparedness Strategy.

Besides reviewing and enhancing surveillance for screw-worm fly, the Strategy has resulted in Australia undertaking several actions to improve our readiness. A bio-economic model has been created to help authorities appreciate the impact of an outbreak of screw-worm fly and evaluate the likely benefits of various strategies to counter such outbreaks. A manual for the diagnosis of screw-worm fly was produced for scientists and vets to quickly identify infestations (with keys to distinguishing screw-worm fly from other similar looking flies).

Work has been undertaken to produce better attractants for screw-worm fly to further improve our ability to detect their presence at the earliest possible time. Research is also being undertaken to develop chemicals and vaccines that might provide protection to livestock (and humans) from

screw-worm flies.

However, even if we are ready and watching carefully for screw-worm flies, it's believed that our only chance of controlling and eradicating these pests is through the 'sterile insect release method', so a high priority has been placed on determining how effective the system is. (Earlier successes with the technique in America were based on trials against New World screw-worm fly, not the Old World fly).

Being prepared

It was decided that a pilot sterile fly manufacturing plant was needed in a country where Old World Screw-worm fly is widespread. Malaysia has had a problem with this fly for many years and was interested in undertaking collaborative research with Australia. The result has been the establishment of the Myiasis (screw-worm fly infestation) Control Research Project at the Institute Haiwan, near Kluang, Johor, Malaysia.

The first achievement of the Project has been the building of a small-scale sterile Old World screw-worm fly production facility and the establishment of a laboratory-based colony of Old World screw-worm flies (sampled from Malaysian cattle). The production facility was completed at the beginning of 1997 and it's planned that sterile flies will be ready for release later in the year.
When running at full production, the factory will be producing up to 10 million sterile screw-worm flies a week! This will enable scientists to monitor the effectiveness of the technique and develop improved production systems for larger scale productions. If trials are successful then the possibility of a larger scale fly factory, producing up to 250 million sterile screw-worm flies, will be considered for construction in Australia.

The Project will benefit Malaysia in the short term and Australia and Southeast Asia in the medium and longer term through an improved understanding of Old World screw-worm fly and techniques for its control.

Another major benefit of this scheme is that the information being gained could well be employed against other major insect pests already in Australia such as the fruit fly or the sheep blowfly.

This program is being undertaken under a Memorandum of Understanding between the governments of Malaysia and Australia. The pilot facility has been constructed by CMPS&F Pty Ltd, a major Australian engineering firm, for the Commonwealth. The research and development projects will be performed by CSIRO's Division of Entomology and CMPS&F with financial support from the livestock industries and the Commonwealth through the Meat Research Corporation, the Australian Wool Research and Promotion Organisation, the Dairy Research and Development Corporation and the Exotic Animal Diseases Preparedness Consultative Council. The project is a collaboration with the Malaysian Department of Veterinary Services which is providing staff, support, infrastructure and access to experimental herds.

Waiting

Maybe the screw-worm fly will reach Australia, maybe it won't. However, to be unprepared for a possible outbreak would be extremely irresponsible to our livestock industries and our human population. As with so many aspects of our lives, to do nothing is a very risky course. Thankfully, in a couple of years, we should be able to say with confidence that we're fully ready for the 'killer maggot'.

Source

Pamphlet *Ready for the killer maggot*: CSIRO and

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Red Imported Fire Ant : A new introduction into Australia and a request for assistance in detection of the ants in the Northern Territory

Graham Brown, Quarantine Entomologist
Department of Primary Industry and Fisheries

Department of Primary Industries and Energy.
Red imported fire ant (RIFA), *Solenopsis invicta*, has recently been detected in Australia. This ant is a serious pest to agriculture and a severe nuisance to the general public with important medical implications. It has not previously been recorded in Australia.

In February, RIFA was detected at Fisherman's Island, near the seaport of Brisbane, and at a plant nursery at Richlands, about 20 km to the southeast. Following press releases and media interest, it was found to cover an area of approximately 800 hectares near the Brisbane wharves, and a further 3000 hectares in the Richlands/Wacol area. It has also been found at Cooroy 100 km north of Brisbane in several pots that had been purchased from the Richlands nursery and at Moggill in Brisbane. It has also been found at Dandenong, Victoria in pot plants sold by the nursery.

Distribution

This ant is a native to southern Brazil where it occurs in low numbers. However, it was introduced into Florida, USA sometime prior to 1930. Since then it has spread throughout most of the southern United States where it occurs in large numbers and has become a major pest.

It is not known how the ants entered Australia, or how long it has been here. However, nursery workers at Richlands have been aware of the problem ants for perhaps two years and tracebacks of the distribution records of the nursery have not revealed any other than the one at Dandenong. Stringent regulations are now in place to prevent the spread and to eradicate the ant in Queensland. RIFA is a declared pest in Queensland and the Northern Territory (NT), and the import of soil or untreated nursery stock into the NT is prohibited. It is unlikely that the ants are present in the NT.

Pest status

RIFA nests in the soil particularly in disturbed situations, but may also occur in pot plants, and under concrete slabs. They feed on dead animals including insects, earthworms and vertebrates, honeydew, small seeds, and opportunistically feed on tender shoots of a wide variety of plants. It is predominantly a public nuisance but is also an agricultural pest because of it prevalence on farms where it can attack small animals, damage harvesting equipment and other farm machinery, and interfere with the cultivation, watering and harvesting of produce. The cost of RIFA in the USA is in excess of $US1 billion per annum.

Sting of the Ant

These ants aggressively attack when their nest is disturbed. They are able to bite the skin for purchase and then sting repeatedly. Stings are painful and cause a burning and itching sensation followed by the development of a white pustule one day later. As a result they may become infected and may leave permanent scars. Severe cases of evenomation may cause chest pains, nausea, severe sweating, loss of breath, slurred speech or even death. People may also develop sensitivity to the stings and should seek medical help if they are severely stung, exhibit these symptoms, or are sensitive to ant, bee and wasp venom.

Recognition

The majority of ants found in nests are workers. This species has workers that are red to brown in colour with the last section of the abdomen black, and a distinctive sting at the tip of the abdomen. Workers are variable in size, and range from 2.4 to 6 mm in length. They nest in the soil and build large characteristic mounds up to 40 cm high. When mounds are disturbed, ants swarm over the intruder and cause multiple stings. As noted, a result of these stings is a white pustule developing the following day.

RIFA is closely related to *Solenopsis geminata*, which is locally known in the NT as the ginger ant. This ant is also introduced but is only recorded in Australia from the Top End area. It is similar in appearance, but yellow brown in colour.

It does not construct large upright mounds, and while it attacks in a similar fashion to RIFA, stings do not produce such well-defined white pustules. Apart from these two species of *Solenopsis*, no other ant species in Australia cause pustule development after stinging.

We would like all NT General Practitioners to be aware of the situation in Queensland and bear in mind the widespread distribution of ginger ant, at least in the Darwin area. If there is any indication that patients are presenting with severe cases of these symptoms, they should contact the Entomology Branch, Department of Primary Industry and Fisheries, 8999 2260. Details required that can be obtained at the time of presentation include; a description and specimen of the offending ants, a location where the ant bites took place, permission for entomology to contact a person to talk to about the bites, and a contact number for the patient. Specimens of ants can be collected and stored in a small bottle in methylated spirits.

This information will help the Entomology Branch to detect if and where an importation into the NT occurs so that immediate elimination measures can be implemented.

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Ants

Ants in the sausages,
ants in the bread,
ants in the teapot
and underneath the bed.

Running across the ceiling,
running across the floor,
every time you turn around
there seems to be more.

Black ones in the kitchen,
pale ones in the loo,
green ones in the garden
and in the cupboards too.

Millions upon millions,
they form an endless stream,
"Oh no, move quick!
They're creaming off the cream!"

Chicken on the table,
salad on a plate,
if it ain't moving,
it's ant tucker, mate!

When turning on the light,
the switch clicks and hums,
twenty thousand ants inside
are getting flaming bums!

Hit them, squash them,
flush them down the sink,
it doesn't matter what you do
they're back within a wink.

So we'd better admit defeat,
and accept their right to live
for they're simply innocent,
"Come on, let's forgive."

So I really tried I did
to not kill any more
until I found them in my jocks
and now it's all-out war!

For they can have the chicken,
bread, cheese, beef and tarts,
but one thing they'll never have
is my private parts!!!!

David Peacock

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NT Malaria notifications — October to December 2000

Merv Fairley, CDC, Darwin

Eighteen notifications of malaria were received for the fourth 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.

Number of cases	Origin of infection	Reason exposed	Agent	Chemoprophylaxis	Comments
4	PNG	Work	*P. vivax*	No	Diagnosed ASH
2	Indonesia	Holiday	*P. vivax*	No	Diagnosed RDH
1	Indonesia	Holiday	*P. vivax*	Yes	Diagnosed RDH
9	East Timor	Work	*P. vivax*	Yes	Diagnosed QML
2	East Timor	Work	*P. vivax*	Yes	Diagnosed RDH

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Points to note regarding notifications on page 31

(A relative newcomer to the NT)

- The number of adverse events following immunisations (AEFI) reported in 2000 was more than double the number reported in 1999. This is most likely due to increased reporting of adverse events following:
  - increased education on the importance of, and legal requirement for, notification of AEFIs during the lead-up to the implementation of the new vaccination schedules on 1 May 2000; and
  - the expansion of the list of adverse events requiring notification in the 7th edition of "The Australian Immunisation Handbook", released early in 2000.

- The number of AEFIs reported in 2000 is likely to be closer to the true incidence of AEFIs than the number reported in 1999.

- The fall in syphilis notifications, particularly in East Arnhem and Katherine, follows increased screening in 1999 and hopefully better disease control.

- Cryptosporidiosis notifications markedly increased in 2000. There are two possible reasons for this. Firstly, notifications would be expected to steadily increase for a while following its addition to the notifiable disease list in April 1999. All regions, except East Arnhem, recorded more cases in 2000 than in 1999. Secondly, there was a significant disease outbreak in Darwin late in 2000.

- In March-May 1999, there were outbreaks of rotaviral enteritis in the Barkly, Darwin and Katherine districts which were not repeated in 2000.

- Following the heavy rains in early 2000, Central Australia had 4 cases of Murray Valley Encephalitis (included under "Arboviral Disease). These plus the 3 diagnosed in Darwin were the first cases of MVE in the Territory since 1993.

- The great increase in dengue notifications for 2000 reflect the increased person traffic between East Timor and the Northern Territory. None of the cases were locally acquired.

- The increase in glomerularnephritis notifications reflects the outbreak across 15 Aboriginal communities. Ten interventions were mounted in 7 communities between February to July 2000.

- Brucellosis, Chancroid, Cholera, Congenital Rubella Syndrome, Congenital Syphilis, Diphtheria, Gastroenteritis, Hepatitis C (incidence), Hepatitis D & E, Hydatid Disease, Lymphogranuloma venereum, Poliomyelitis, Typhoid and Viral Haemorrhagic Fever are all notifiable but had "0" notifications in this period.

NT Notifications of Diseases by Districts—2000 and 1999

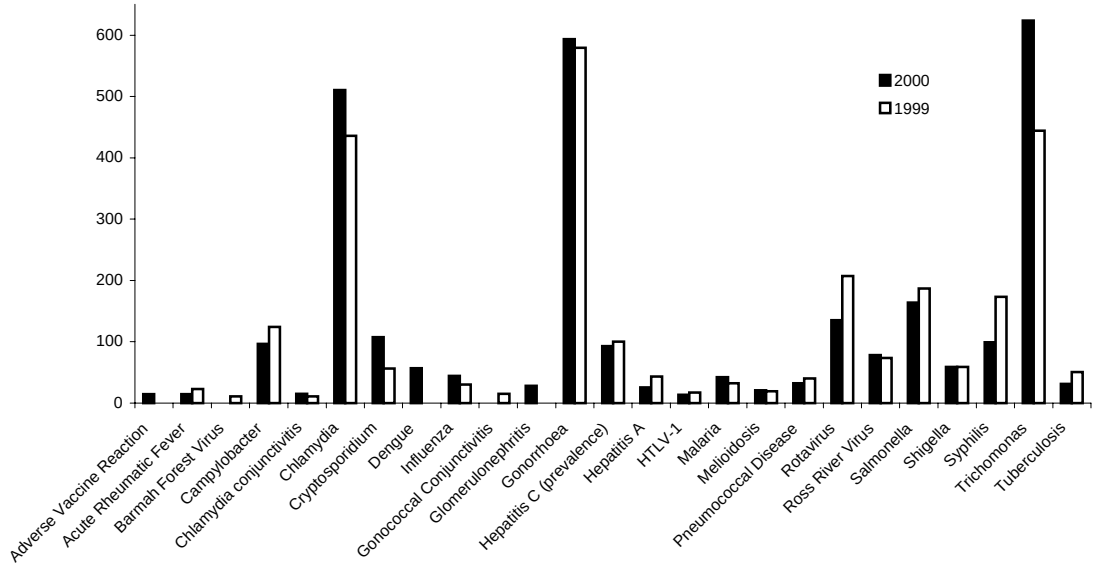
DISEASES	ALICE SPRINGS		BARKLY		DARWIN		EAST ARNHEM		KATHERINE		TOTAL	
	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999
Acute Rheumatic Fever	6	3	2	4	9	10	5	13	5	19	27	49
Adverse Vaccine React.	0	0	1	1	24	3	0	1	2	6	27	11
Amoebiases	0	0	0	0	2	0	0	0	0	0	2	0
Arbovirus infections												
MVE	4	0	0	0	3	0	0	0	0	0	7	0
Barmah Forest Virus	1	0	0	1	7	13	0	5	1	2	9	21
Dengue	0	0	1	0	109	14	0	0	1	1	111	15
Kunjin	1	0	0	0	1	1	0	0	0	0	2	1
Ross River Virus	16	0	10	6	88	114	8	8	31	14	153	142
Atypical Mycobacteria	0	1	0	0	2	0	0	1	0	2	2	4
Botulism	0	0	0	0	1	0	0	0	0	0	1	0
Campylobacter	58	66	6	0	94	155	7	8	23	13	188	242
Chlamydia	481	328	18	20	320	337	68	65	112	104	999	854
Chlamydia Conjunct.	1	7	0	0	26	12	1	0	1	3	29	22
Cryptosporidiosis	69	33	7	0	100	26	7	35	27	16	210	110
Donovanosis	2	4	0	0	1	0	0	0	3	2	6	6
Glomerulonephritis	1	0	0	1	20	3	27	1	6	3	54	8
Gonococcal Disease	704	498	51	42	192	320	70	96	145	179	1162	1135
Gonococcal Conjunct.	8	2	0	0	0	4	0	0	0	23	8	29
Haemolytic Uraemic Syn	0	0	0	0	0	1	0	0	0	0	0	1
Haemophilus Inf type b	0	2	0	0	0	1	1	0	1	0	2	3
Hepatitis A	9	11	0	5	35	60	1	1	4	8	49	85
Hepatitis B	3	0	2	5	1	6	0	1	4	4	10	16
Hepatitis C (prevalence)	31	14	2	0	139	171	1	3	10	8	183	196
HIV infections	0	0	0	0	9	7	0	0	0	1	9	8
HTLV-1	22	23	0	4	0	3	0	0	3	3	25	33
Influenza	31	28	1	1	41	19	9	4	4	7	86	59
Legionnaires Disease	0	0	0	0	1	1	0	1	0	2	1	4
Leprosy	0	0	0	0	1	0	0	0	0	0	1	0
Leptospirosis	0	0	0	0	7	0	0	0	1	1	8	1
Listeriosis	3	0	0	0	0	0	0	0	0	0	3	0
Malaria	4	1	0	0	76	59	0	1	2	1	82	62
Measles	0	0	0	0	0	10	0	0	0	0	0	10
Melioidosis	2	0	0	0	33	31	1	2	6	5	42	38
Meningococcal Infection	4	4	0	1	3	1	2	1	1	1	10	8
Mumps	1	0	0	0	3	2	0	1	0	0	4	3
Ornithosis	0	0	0	0	0	0	0	0	1	0	1	0
Pertussis	5	0	0	0	1	2	0	0	0	0	6	2
Pneumococcal Disease	41	46	1	0	13	24	2	2	6	7	63	79
Rotavirus	119	125	13	43	53	131	64	53	15	53	264	405
Rubella	0	0	0	0	0	3	1	0	0	0	1	3
Salmonella	81	58	7	12	161	213	20	23	53	61	322	367
Shigella	54	50	4	3	32	39	22	15	3	9	115	116
Syphilis	58	77	7	55	79	101	20	59	30	47	194	339
Trichomonas	356	114	20	14	315	303	274	250	257	188	1222	869
Tuberculosis	12	5	1	1	42	85	1	1	4	6	60	98
Typhus	0	0	0	0	1	0	0	0	0	0	1	0
Vibrio Food Poisoning	0	0	0	0	0	0	0	0	0	1	0	1

Notified cases of vaccine preventable diseases in the NT by report date 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	2	3	0	2
Hepatitis B	10	16	0	0
Measles	0	10	0	3
Mumps	4	3	1	1
Pertussis	6	2	2	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 2000 and 1999 Rates per 100,000



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

Disease Control Staff Updates

Alice Springs

Annette Coppola has vacated the position of coordinator of the Tristate Project, to be the A/ Manager of Health Development.

Kirsty Smith has moved from CNC Women's Educator in the sexual health unit to coordinator, Tristate Project.

Eleanor Hooke will be returning to Alice Springs to take up the position of CNC Women's Educator.
Nicole McIntosh commenced in February as CNC, syphilis information system.

Darwin

Justine Glover has taken up the position of Chronic Diseases and Injury Prevention Project Officer. Justine has been in the NT since 1995 in a variety of THS roles. Most recently she has been working in Community Health on the Preventable Chronic Diseases Strategy Performance Indicators

Sandra Downing is backfilling the Research/ Project Officer position while Sue Reid is on maternity leave. Sandra has a wide range of health experience both within the NT and other states and has recently returned from 6 months in East Timor.

Jackie Mein has left the AIDs/STD section and **Dr Steve Baguley** has taken over this role. Steve comes to us after spending the past two years working in a sexual health clinic in south west England.

Aids/STD administration officer, **Di Farrand** has a 3 month temporary transfer - this position will be backfilled by **Craig Atkinson** from RDH**.**

Sexual Health Educator, **Naomi Oliver** has accepted a 12 month position with Alcohol and Other Drugs Services.

Community Child Health Nurse, **Sue Kruske** has moved to Sydney to take up a research nurse position with the University of Sydney.

Brad Palmer has returned from Purchasing and is currently acting as community child health nurse.

JR Gadil, previous Paediatric Registrar at RDH has been appointed Community Paediatric registrar.

Matthew Parnaby, men's sexual health rural coordinator, is leaving at the end of March. He is taking up a 10 month position with Medicins sans Frontieres (Doctors without Borders) in Abkhasia, Georgia, Former Soviet Republic to help supervise the TB program for hospitals, prisons and community health centres.

Karen Dempsey, AIDs/STD project officer, has moved to Mt Isa to commence a Master of Applied Epidemiology.

Charles Roberts (Darwin) and **Susan Grant** (Alice Springs) have been appointed to conduct a needs assessment on hepatitis C, needle and syringe program and injecting drug use. Charles has worked with a variety of community organisations on blood borne virus prevention and education while Susan has previously worked with Family Planning Services.

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