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A Case of Scrub Typhus from Litchfield Park
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A 26 year old male presented on 30 June 1996 complaining of fatigue and backache. He had been camping in Litchfield Park around two weeks before he became sick. He was afebrile but had enlarged, tender right inguinal lymph nodes on examination. Examination of his chest, cardiovascular system and abdomen was unremarkable. He had no relevant past medical history. Epstein Barr virus serology indicated past infection.

He re-presented on 4 July complaining of feeling increasingly unwell with profound weakness, fever, headache, diarrhoea, a rash and bilaterally enlarged inguinal nodes. On examination, he was afebrile, but tachypnoeic with a pulse rate of 100/min and BP 110/60. He was noted to have right bronchial breathing and was given procaine penicillin 1g IMI stat while awaiting the result of an urgent CXR. Investigation results included normal U/E/Cr, MSU, CXR and negative hepatitis A, B and C and HIV serology. Abnormal FBC, LFTs and urinalysis results are reported in

Table 1. He was referred to Royal Darwin Hospital with his results for clinical review on the same day. In A&E he was noted to be febrile (38.5°C), with a confluent erythematous macular rash on the trunk. A small healing ulcer was noted on the right side of the scrotum. He was diagnosed as a viral illness and sent home.

On 8 July he was still unwell. The scrotal ulcer had developed a black scab consistent with the clinical picture of an eschar. Paired sera were collected on 8 and 22 July for Rickettsial serology (*R. australis* and *R.*

Table 1 Initial investigations

Date	Investigation	Result (normal range)
4/7/96	FBC	Hb 176 g/L (135-180 g/L)
		Platelet count 68 x10 ⁹ /L (150-450)
		WCC 8.7 x10 ⁹ /L (4.0-1.0)
		Neutrophils: toxic granulation consistent with an inflammatory or infective process
	LFTs	LDH 621 U/L (80-500 U/L) ALT 96 U/L (0-45 U/L) AST 96 U/L (0-41 U/L)
	Urinalysis	Protein (+) Urobilinogen (+)

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tsutsugamushi). On the basis of a provisional diagnosis of scrub typhus, he was started on definitive treatment for the illness (doxycycline 100mg bd for two weeks) and he completely recovered.

Scrub typhus, caused by *Rickettsia tsutsugamushi*, was

Table 2 Serological tests for Rickettsial infection

Test	Acute result	Convalescent result	Normal range
Weil Felix screening test	8/7/96	22/7/96	
Proteus vulgaris OX-9 *	<20	<20	<20
Proteus vulgaris OX-2 *	20	20	<20
Proteus vulgaris OX-K *	160	>2560	<20

* Agglutination

indicated by the Weil Felix screening test for Rickettsial infection (Table 2) and confirmed by a four fold rise in titre in a species-specific antibody test conducted on paired sera tested at the Fairfield Hospital in Melbourne (Table 3).

Table 3 Rickettsia serology, Fairfield Hosp.Melbourne

Rickettsia serology	Ab	Result 8/7/96	Titre 8/7/96	Result 22/7/96	Titre 22/7/96
R. australis	Total	Not detected	<64	Equivocal	64
R. tsutsugamushi (Scrub typhus group)	Total	Positive	1024	Positive	4096
	IgM	Detected		Detected	

Scrub Typhus in Litchfield Park

Bart Currie, Royal Darwin Hospital and Menzies School of Health Research.

Peter Whelan, Medical Entomology.

Between August 1990 and November 1991, there were five confirmed cases of scrub typhus (*Rickettsia tsutsugamushi*) acquired in Litchfield Park.¹ A further case from Litchfield Park, acquired in October 1993, was diagnosed in a Western Australian tourist (Dr Liam O'Connor, Perth). The case described above from June 1996 is the seventh confirmed case. Until these cases and a case from the Kimberley in July 1993,² it was generally considered that scrub typhus in Australia did not extend west of north east Queensland. A mammal trapping survey in areas of Litchfield Park visited by the first two cases showed a high prevalence of the vector mite *Leptotrombidium deliense* infecting three native rat species.³ Previously this mite had not been found in the Northern Territory. The geographic distribution of scrub typhus is usually patchy; in north Queensland most of the circumscribed foci ("mite islands") have been humid rainforest areas with annual rainfall exceeding 1500 mm. It is possible that *R. tsutsugamushi* and its vector mite, *L. deliense* have been infesting native mammals in the Litchfield rainforest for even millions of years. The area was opened to the public as Litchfield National Park in 1986. There may be other circumscribed foci of vectors, rodents and rickettsiae in discrete rainforest habitats of northern Australia where humans have so far rarely visited.

Scrub typhus virulence varies between strains of *R. tsutsugamushi*. Two of the cases from Litchfield Park have been critically ill,¹ suggesting a virulent organism. All cases have had a primary eschar (skin ulcer, often with central black crust), corresponding to the site of mite attachment. The mites are under 0.4 mm in length, so are not usually seen. The eschars (4-8 mm) have been on genitals, buttocks or lower abdomen. Incubation period has been 7-14 days. Scrub typhus is an acute

febrile illness with headache, profuse sweating, lethargy and sometimes myalgia, conjunctival injection, lymphadenopathy, splenomegaly and a delayed maculopapular rash (usually truncal).⁴ Cough and chest x-ray infiltrates are common. White cell count may be normal, but thrombocytopenia and abnormal liver function tests are common. Diagnosis is made by paired serology showing a rise in specific antibodies to *R. tsutsugamushi*. Doxycycline is the treatment of choice. Mortality is higher in older patients, those with underlying chronic illnesses and with delays in treatment. Without treatment mortality can be up to 60% with virulent strains.⁴

Our investigations suggest more than one location within Litchfield Park as infecting sites for scrub typhus. Sitting or lying on the ground without a groundsheet or mat in grassy areas near creeks, especially away from the established day use areas at public amenities locations is a likely scenario for inoculation. DEET-containing insect repellents will help reduce contact with the mite vectors and permethrin impregnated clothing is recommended for those working in areas of scrub typhus transmission.

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A Fatal Case of Scrub Typhus - From Litchfield Park

Late Addition

A further case of scrub typhus occurred in late August 1996. The patient was a 38 year old male working in

Litchfield Park and he died in intensive care at Royal Darwin Hospital.

Typhoid and Paratyphoid - Salmonella on the Timor Sea

Fay Johnston, Disease Control, Darwin and National Centre for Epidemiology and Population Health, Australian National University, Canberra.

The notification

On Thursday June 27 the Disease Control Centre (DCC) in Darwin was notified of an inpatient with a possible diagnosis of typhoid fever. The patient, an Indonesian worker from an oil rig in the Timor Gap, had been evacuated after collapsing while on duty. The clinical picture was consistent with typhoid fever and blood cultures grew salmonella. At the time of the preliminary notification, the species had not been identified.

Enteric Fever (Typhoid and Paratyphoid)

The patient presented with the symptoms of enteric fever. The organism classically responsible for enteric fever is *Salmonella typhi* and then it is more commonly referred to as typhoid fever. Enteric fever is also caused by other organisms, notably, *S. paratyphi*.

Typhoid fever is characterised by fever, headache, abdominal pain, diarrhoea and nausea and if untreated has a fatality rate of about 20%. However, with appropriate antibiotic treatment the death rate is less than one percent. Chronic carriage occurs in 5-20% and can follow subclinical disease.

S. paratyphi as noted can also cause enteric fever, i.e. paratyphoid fever as well as a simple gastroenteritis. Paratyphoid fever produces a clinical syndrome similar to typhoid. Symptoms can last for up to two weeks but fatalities are rare. A small proportion of people continue to carry bacteria in their gut after they have recovered from the illness. Likewise simple gastroenteritis can produce chronic gut carriage.

Paratyphoid and typhoid are transmitted by contact with the faeces or urine of either a patient with the disease or a healthy carrier of the bacteria. It can also be transmitted by contaminated food (especially milk, milk products and shellfish) and occasionally water.

Diagnosis is confirmed by isolation of the bacteria from stools, urine or blood cultures.

The incubation period for both typhoid and enteric fever due to *S. paratyphi* is one to three weeks while simple gastroenteritis from *S. paratyphi* has an incubation period of one to ten days. This patient with enteric fever had been aboard the rig for eleven days and had felt unwell for four of them and so it is likely that he acquired the infection in Indonesia before travelling to the oil rig. His job on the oil rig did not involve the preparation of food.

The Setting

Of the 80 workers on the rig, half were Indonesian and

half were Australian. They shared accommodation and ate in a communal dining room. They usually work for two or three week periods after which they are flown by helicopter to Darwin and from there most fly directly home.

Public Health Action

Typhoid and paratyphoid are notifiable diseases in the NT and prompt notification (as occurred in this case) by phone to Disease Control, Territory Health Services (THS) is essential so that action can be taken to prevent further cases. Investigation of this case required close cooperation between management and operators of the rig and THS staff.

At the time of notification, but prior to the complete identification of the organism a helicopter with ten workers aboard was flying to Darwin from the rig. Some of the workers were due to fly immediately to other parts of Australia, Singapore, USA, Indonesia and Scotland. Most were held at Darwin airport where they were interviewed by THS staff. Forwarding contact addresses were obtained and information about typhoid and other enteric diseases was provided including the prevention and control of these diseases and what to do if they became unwell. They were considered to be at low risk of being in contact with the possible case and were recommended to proceed with their planned travel. The remainder were seen at their hotels or contacted by telephone.

Catering staff on the rig immediately closed the self service salad bar and served only hot cooked foods. The health staff aboard the rig, an Indonesian doctor and an Australian nurse/medic, briefed all crew members about the importance of scrupulous attention to hygiene, particularly hand washing after going to the toilet and prior to eating.

The organism was identified as *S. paratyphi* B that evening. Although a potentially less serious disease the public health action did not change.

THS met with all workers scheduled to go out to the rig. Information was provided about paratyphoid and particularly to reinforce the message of the importance of good hygiene while living in confined, communal conditions.

An information sheet in English about *S. paratyphi* was distributed to all workers involved with rig operations. Information was given verbally to the Indonesian workers aboard the rig by the (Indonesian) doctor and to the inpatient at Royal Darwin Hospital (RDH) through an interpreter.

Microbiological Investigation and Results

The health staff reported no cases of diarrhoea or other illness on the rig. Sixteen faecal specimens were collected on the oil rig from all contacts of the patient and from all staff involved in food preparation. These were sent by helicopter to Darwin where customs officials delivered them to THS and they were processed by RDH laboratory staff.

All faecal specimens were negative for *S. paratyphi*, however, one was positive for a different species of Salmonella. This person was clinically well and not involved in food preparation. Second specimens were collected one week later from this person, and also from one of the cooks who initially had a liquid specimen. They were both negative for all enteric pathogens.

Discussion

This single case of enteric fever due to *S. paratyphi* B was most likely acquired in Indonesia and imported to the oil rig in the Timor Sea. The main immediate public health issue was the potential for rapid transmission of enteric disease among oil rig workers who have communal living and eating arrangements. The other priority was to exclude the possibility that the source of the infection was a cook on the oil rig and the potential for ongoing bacterial transmission.

The international aspect of oil rig operations added other interesting issues. The workers come from two populations with quite different prevalences of enteric diseases including typhoid and they live and work very closely together while on the rig. Special precautions

such as vaccination against typhoid and hepatitis A for Australian oil rig workers and screening of all staff involved with food preparation for carriage of enteric pathogens are not routinely recommended but may well deserve consideration in this setting.

Communication across language barriers and from medical English into plain English is an important issue. Two Indonesian men returning from the rig thought that our entire discussion was about "typhoons" rather than typhoid. Of those who had English as a first language there was confusion about the difference between typhus, typhoid and paratyphoid fever which was interpreted by some as being a disease of birds ie "parrot typhoid".

Most workers had heard of typhoid, considered it to be an exotic, dangerous illness and were frightened by the possibility of having been in contact with the disease. Provision of simple factual information relieved a lot of anxiety and allowed for an efficient investigation with cooperation from all relevant people and organisations.

Disease Control wish to thank all people involved in the investigation of this case. The management and workers of the oil rig, the offshore medical staff, the airline and customs officers at Darwin Airport all provided a cooperative and efficient environment to carry out necessary public health measures. Recognition goes to the microbiology laboratory staff of RDH who processed a large number of specimens out of hours and at short notice and to the treating doctor and microbiologist for their prompt notification of the case.

Measles "R.I.S.C.C." Management in Central Australia

Nicholas Williams and Jenny Rossiter, Disease Control, Alice Springs.

From mid July to August 1996, Disease Control in Alice Springs has been notified of four cases of illness that fulfill the clinical case definition for probable measles. Two of these have subsequently been notified as measles cases.

The first case was in a 12 month old non-Aboriginal child seen in a general practice in Alice Springs. Measles IgM was subsequently negative and the case was not confirmed. The second case was in an adult German tourist recently arrived in the Centre via Sydney, who visited Yulara in the preceding week. This case was serologically confirmed. The third case was in a 30 month old non-Aboriginal child in Yulara. Measles IgM was negative and the diagnosis of measles was not confirmed. The fourth case was in an 18 month old non-Aboriginal child who had been a contact of the

German index case in the Emergency Department of Alice Springs Hospital (ASH) on 3 August 1996. This child had been vaccinated with MMR on 7 August, 4 days after exposure to the index case, as part of the index case investigation. He presented with clinical measles on 18 August 1996. Serology could not be obtained from this child, but he fulfilled the clinical and epidemiological case definition for notifiable measles. It is possible that the illness was actually a measles immunisation reaction or measles modified by vaccination.

Our response to these notifications has been to develop an "Action Plan" to enable a timely and efficient response to suspected cases. This action plan is intended as an adjunct to existing protocols and outlines the "actions" required by Disease Control staff after the

first report of a suspected measles case. The plan is described by the mnemonic **R.I.S.C.C.** (Record, Isolate, send Specimen, Contact trace and Contact agencies).

Day 1

Record - informer's name and phone number. Complete "Rash illness investigation" report

Isolate suspected case in respiratory isolation for 4 days after the appearance of the rash.

Specimen of blood for Measles IgM to be obtained and sent urgently to the laboratory. Ensure **result is phoned** to the referring health care provider.

Contact tracing and Contact primary health care (PHC) agencies. Begin "Measles Control Measures for Contacts". Contact **by phone** relevant PHC provider organisations around the suspected case. Those contacted will vary according to where the suspected case was diagnosed and where he/she has been in the last 10-14 days, but will always include Disease Control, Darwin, Disease Control, Tennant Creek, Southern Region Director, ASH Emergency Department, town based private general practices, Central Australian Aboriginal Congress (CAAC) and Remote Health. Contact **by fax** all relevant PHC provider organizations - "Attention - Possible Measles".

Days 2 & 3

Check on the condition of the suspected case and

continue contact tracing around the case.

Obtain measles IgM result. If negative, reassess case regarding likelihood of measles diagnosis; if unlikely to be measles, fax all PHC agencies with "Not confirmed".

If positive or diagnosis remains most probable irrespective of the IgM result - fax "Attention - Confirmed Measles case" to all PHC agencies and continue to vigorously follow "Contacts Protocol".

Days 3, 4 & 5

If another case of measles is reported or identified - arrange face-to-face/teleconference meeting with all relevant PHC agencies to develop an action plan for control of possible epidemic ("Community Outbreak").

This action plan has already resulted in increased notifications of suspected measles cases from general practitioners, created interest amongst GPs to perform opportunistic immunisations during outbreaks and considerably improved communication between Disease Control and the agencies that it serves. It has been distributed to PHC agencies for comment and will be modified accordingly. As part of the plan, proforma notification faxes have been written and a network fax system established. Within 30 minutes of notification of a suspected measles case Disease Control, Alice Springs can now put into place efficient strategies to significantly lower the **RISCC** of a measles outbreak.

Editorial

Measles remains a serious disease in malnourished infants and children, with a real risk of hospitalisation, disability and sometimes death. For this reason, a single case of suspected measles diagnosed in the NT is regarded as a potential outbreak. Because measles is a highly infectious disease spread by the respiratory route, early notification of a clinically suspected case is essential for successful control. Suspected measles should trigger the following public health response: confirmation of the diagnosis both clinically and serologically; active case finding among contacts and immunisation of susceptibles; and enhanced surveillance involving hospital-based and community-based health care professionals, laboratory staff, educational institutions and other agencies working with children. Regular feedback to agencies participating in surveillance is an essential part of the surveillance loop.

In this article, Williams and Rossiter have described an action plan used successfully in Central Australia. The plan (RISCC) has gone a long way in addressing some of the blocks to early notification of suspected measles by making available specially designed fax sheets for measles notification and setting a time frame for

following through with a notification from initial diagnosis to control measures. This plan is an adjunct to existing protocols available to health care providers in the NT, namely *The NT Measles Protocol: Guidelines for Disease Control and Measles Control Measures for Contact*. An NHMRC document titled *The control of measles in Australia. Guidelines for measles outbreak control* is currently in press and is the synthesis of clinical, laboratory and epidemiological expertise in the control of measles in Australia. Available soon.

Measles control measures should never be delayed while waiting for serological confirmation because prevention of measles in a susceptible contact using immunisation with MMR is effective only if the vaccine is administered within 72 hours of first exposure. Measles IgM can take up to 30 days to appear in the blood, so a negative result does not necessarily exclude measles. Conversely, the presence of measles IgM may not be diagnostic if the person has been recently immunised. In a previously immunised person, measles may be diagnosed on the basis of a four fold or greater increase in measles specific IgG between acute and convalescent phase sera taken at least 14 days apart and tested in parallel. Clinical symptoms of measles (fever to 39.4°C, malaise, slight cough, coryza, conjunctivitis

and a mild non-infectious rash) occur in 5-15% of non-immune vaccinees 5-12 days after vaccination. These symptoms last for 1-2 days and may sometimes include Koplik spots, so it may be very difficult to distinguish this immune response to the vaccine measles virus from infection with wild measles virus. It is particularly problematic during outbreaks when persons may be immunised after exposure to wild measles and the IgM response is unhelpful in diagnosis.

The clinical case definition of measles proposed by the Centers for Disease Control, Atlanta, more than a decade ago is:

- fever above 38.4°C
- generalised maculopapular rash lasting for at least 3 days, and
- at least one of cough, coryza, conjunctivitis, or Koplik spots.

The sensitivity of this definition is very high at 92% (ie a clinician will *correctly diagnose 92% of true cases of measles* using these criteria). However, the specificity (ie the clinician's ability to *correctly diagnose that the person does not have measles* when presenting with these symptoms) is only 24% now that measles is an uncommon disease in Australia.

Control measures shouldn't wait for 3 days of rash and laboratory confirmation, so Ferson et al¹ suggest a modified clinical case definition:

- **cough and fever present at the onset of the rash.**

Older clinicians experienced in the diagnosis of measles follow the principle that "if there isn't a cough, it's not measles". Ferson et al's definition has an equal sensitivity to the CDC definition, but a greater ability to distinguish a non-measles illness clinically (57% specificity). The authors strongly support the need for laboratory testing when sporadic cases occur. During outbreaks, use of the modified clinical case definition will improve the accuracy of case ascertainment without testing *once the initial cases are confirmed serologically*.

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TB - The Mini Outbreak in Central Australia

Olive Aumann, Disease Control, Alice Springs.

There have been 17 cases of TB notified in the Central Australian region since June 1995. This compares with a previous average of four cases annually during the preceding six years.

Historically, the Central Australian region, which extends from south of Tennant Creek to northern SA and eastern WA Aboriginal communities, has had relatively low rates of TB when compared to the rest of the NT. The average yearly rate in the years 1989 - 1994 for the total population in this region was 11/100,000 population and 29/100,000 in the Aboriginal population. The rate for the total NT for this same period declined from 40/100,000 to 17/100,000 (60 to 30 cases per year) but remain much higher than the national rate of 5-6/100,000.

In Central Australia, 15 of the current cases are in Aboriginal people; 8 are from 2 northern South Australian communities, 3 from one central NT community, and the remaining 6 are from urban Alice Springs. It has been possible to establish epidemiologic links amongst the majority of these cases through contact tracing and PCR epidemiological typing. Treatment compliance has been satisfactory in 14 of the 17 cases.

Contact tracing and more extensive community screening has occurred in collaboration with the SA TB Control Program. Active case finding is expected to identify further cases during the next two years, which, due to the high population mobility could extend over a wide area, crossing State and Territory boundaries. This current outbreak, coupled with the relatively low past incidence of TB in the region has highlighted the need for raised TB awareness and a more coordinated TB control approach in the future.

A strategy is being developed between the NT, SA and WA TB Control Programs and health care providers to standardise TB control protocols throughout the region. The strategy will include standard approaches to treatment regimens, prophylaxis, case monitoring and detection. Accordingly, a meeting was convened in June to commence this process, and a follow-up meeting with teleconferencing is scheduled for late August to develop a Central Australian TB Business Plan. Extensive representation from local primary health care providers and SA, WA, as well as NT public health practitioners has been achieved and should contribute to a coordinated successful outcome.

TB Pericarditis

Janine Spencer,¹ Charles Kilburn,² and Karen Edmonds³

¹Disease Control Centre, ²Darwin Private Hospital, ³Royal Darwin Hospital.

A 10 year old Aboriginal girl from Arnhemland was referred to Royal Darwin Hospital on 5 March 1996 with a three day history of right upper quadrant pain associated with fever and dark urine. Stools were normal in colour and there were no other associated symptoms. She was noted to have a new heart murmur and tender hepatomegaly. Investigations prior to referral revealed an elevated alkaline phosphatase (217 U/L) with negative hepatitis serology.

On presentation the patient was febrile but did not look unwell. She was pale and was not clinically jaundiced. Her weight was 27 kg. She had a loud pericardial friction rub with otherwise normal heart sounds (no murmur) and was normotensive. Further chest examination was unremarkable except for an enlarged firm lymph node in her left supraclavicular area. On abdominal examination she had a tender enlarged liver.

The patient had no significant past medical history. Of note, she was a contact of a known TB case and was due for review by the TB team. Initial chest X-ray revealed enlarged cardiac shadow, bilateral pulmonary effusions, pulmonary oedema and a right lower lobe infiltrate. ECG showed widespread T-wave changes and borderline low voltage. Echocardiography showed significant pericardial effusion with fibrinous strands but no tamponade. Her Mantoux reaction was 40 mm in 48 hours. She also had microcytic anaemia with raised ESR (85 mm/hr). Viral serology was negative and her LFTs and bilirubin were within normal limits.

A provisional diagnosis of TB pericarditis, was made and a pericardial tap was performed under general anaesthesia. 15 mls of haemoserous exudative fluid was removed. On 8 March 1996, she was commenced on a four drug antituberculous daily regimen using rifampicin 300 mg, isoniazid 150 mg, pyrazinamide 750 mg and ethambutol 550 mg plus vitamin B6 25 mg. She was also placed on prednisolone 25 mg twice daily in view of her pericarditis. She made a quick recovery

and at discharge on 15 March 1996 her pericardial rub had gone with the hepatomegaly largely resolved. Follow-up in her community revealed that she was well on directly observed therapy and tolerating the medications well. She had no signs of constrictive pericarditis but a progress echocardiogram was planned.

Diagnosis in this case was based on the reactive Mantoux and clinical scenario suggestive of TB ie. positive contact history and pericardial effusion, which was exudative and showed fibrinous strands on echocardiogram. Prior to the tap a rheumatic fever diagnosis had also been considered. Pericardial fluid and sputum were negative for acid fast bacilli. Cultures of blood, pericardial fluid and sputum were also negative.

A recent retrospective study of 44 children with TB pericarditis in the Western Cape of southern Africa where the disease is endemic, revealed the following: mean age at presentation was 5 yrs (range 7 months - 12 years); a positive family history or close contact was found in only 40%; most frequent symptoms were shortness of breath, cough and fever; hepatomegaly was present in 77%, fever in 52%, pneumonia in 25%, pulmonary oedema in 20%; Mantoux over 10 mm in 75%. On chest X ray 91% had cardiomegaly, 40% had pneumonia and 40% had pleural effusions. Only 14% had bacteriological confirmation of tuberculosis. The majority of the patients (88%) were treated with the four drug regimen of isoniazid, rifampicin, pyrazinamide and ethambutol. Eighteen 41% were treated with prednisolone, with the aim of preventing constrictive pericarditis. Of the five children who developed constrictive pericarditis on antituberculous therapy none had received oral steroids.¹

Reference

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Editorial

TB pericarditis is a relatively rare form of extrapulmonary TB. In England and Wales it accounts for less than 1% of all TB, but is more common in Asian and African populations. In fact, TB pericarditis is probably the commonest cause of pericarditis in the developing world. It occurs most commonly in the 30 to 60 year old age group. In reviewing the 316 TB notified cases in the NT from 1989 onwards, this is the

only paediatric case of TB pericarditis. The other cases were four adults - two male, two female - with ages ranging from 30 to 67 years.

The commonest route of infection to the pericardium is direct extension from contiguous mediastinal or hilar lymph nodes, though extension from lung, spine and sternum as well as miliary spread does occur. In fact, though not clinically apparent, autopsy studies have

revealed up to 20% of TB pericarditis cases have miliary TB. Contiguous spread from primary tuberculous pneumonia is more common in children than in adults. Abrupt presentations resembling idiopathic pericarditis do occur but presentations most often are insidious with fever, night sweats, weight loss, cough, substernal pain in 50% and a pericardial friction rub in one third of cases. When pericardial effusion is present (especially with impending tamponade) dyspnoea, low pulse pressure, increased venous pressure, pulsus paradoxus, hypotension and hepatomegaly may be found. ECG shows non specific widespread T-wave changes and low voltage. Chest x-rays show a large cardiac shadow and mediastinal nodes may be obscured. Pleural effusions which are rare in idiopathic pericarditis, are found in 50% to 70% of TB pericarditis patients and provide a convenient source for diagnostic fluid and tissue. An echocardiogram may show a pericardial effusion, often with loculations or echo-dense strands which are consistent with fibrinous material of TB but which can also be seen in pericarditis associated with malignancy, chronic renal failure or of pyogenic origin. Pericardial fluid findings are similar to those of pleural fluid - usually exudative with elevated protein and lymphocytes and monocytes predominating (except in acute presentations where more neutrophils are seen in the first week or two).

Where TB is not endemic the differential diagnosis may include idiopathic, uraemic, malignant or connective tissue diseases. In endemic areas as in this Arnhemland community the diagnosis is somewhat more straightforward. However, TB endemic areas are often present in populations where pyogenic and rheumatic fever (especially in children) pericarditis also deserve more consideration. Rheumatic fever can present with pericarditis and pleural effusions but a new cardiac murmur and specific ECG findings are often present. Diagnosis of TB pericarditis can be established from a pericardial tap or biopsy or from pleural fluid (if present) including a pleural biopsy. Active pulmonary TB may be present in up to 30% but

sputum culture is positive in only 11% to 30% and positive smears occur less often. TB pericardial fluid is similar to pleural fluid for culturing TB with positive results only in about 50%. If pericardial tissue is obtained culture positive rate can approach 70%. In immunocompetent patients the tuberculin skin test is positive in 83% to 100% of cases.

Untreated TB pericarditis has a mortality of over 80% with constriction eventually occurring in many survivors. Antituberculous treatment and corticosteroids have markedly changed this. Routine antituberculous 4 drug 6 month treatment is indicated and surgery (pericardial window or stripping) is only required if clinical tamponade progresses or recurs despite repeated pericardiocentesis or if constriction develops. Corticosteroids (ie prednisolone 1 mg/kg to max 60 mg) as noted in Hugo-Hamman et al reference above have been shown to be useful in reducing the need for surgery, the incidence of late constriction and overall mortality. Unless there are specific contraindications prednisolone should be given when commencing antituberculous therapy and tapered after 2 months.

Of note, of the NT TB paediatric cases (0-16 years) notified since 1989, 52% were nodal and 32% pulmonary, 88% had positive (10 mm to 70 mm) tuberculin skin tests (Mantoux test) and 92% were contacts of active adult cases.

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Psittacosis - from the lorikeet?

Sid Selva-Nayagam, Darwin Private Hospital.

A 46 year old Darwin man working in a medical laboratory was hospitalised with a febrile illness. He had developed high fever, with rigors and sweating a week earlier, associated with a severe frontal headache. In addition he had arthralgia, mild nausea and anorexia. He developed a dry cough on day five of his illness. On admission to hospital he appeared unwell, was febrile (39°C), dehydrated and had right lung findings. Chest x-ray confirmed patchy consolidation of the

right lower lobe with some mild changes in the right middle lobe. White cell count was $10.1 \times 10^9/L$.

He was treated with broad spectrum intravenous antibiotics (ceftriaxone and gentamicin) and oral roxithromycin as atypical pneumonia was considered likely in view of the dry cough and the normal white cell count. Initial blood culture and sputum examinations were negative. He improved gradually

and was discharged from hospital a week later. On follow-up 2 weeks post discharge, he had symptomatically fully recovered.

Paired serology showed low level titres or no significant change to Influenza A, B, parainfluenza 3, Mycoplasma pneumoniae and Legionella species. Paired serology for psittacosis/LGV (lymphogranuloma venereum) CF (complement fixation) from 30/7/96 to 19/8/96 showed a rise from <1:10 to >1:320 and a diagnosis of psittacosis was made.

At initial presentation he gave no history of exposure

to birds. He had been to the Darwin Show but had fallen ill on the same day, therefore exposure to birds at this event was unlikely to be relevant. On later questioning he reported keeping four chickens at home over the past year, all of which were alive and well. The more probable source of infection however, was felt to be his regular exposure and need to dispose of birds that the cat brought home. He remembered in the week preceding this illness disposing of a dead lorikeet, a near dead small dove and a near dead small finch. He also recalled holding up the lorikeet and displaying its colourful wings to a Territory visitor.

Editorial

Psittacosis - The disease begins after an incubation period of 5 to 15 days or occasionally longer. This eliminates the Darwin Show as an infecting site in the above case. The patient presented with symptoms most suggestive of the disease ie atypical pneumonia with fever, headache, a non productive hacking cough appearing several days after the initial symptoms and a chest x-ray more dramatically abnormal than the physical examination. However, other presentations can include a nonspecific viral illness; a glandular fever type illness with fever, pharyngitis, hepatosplenomegaly and adenopathy; and a typhoid-like illness with fever, relative bradycardia, splenomegaly and rash (Horder's spots resembling rose spots). The illness can range from being subclinical to a mild or moderate to severe illness, especially in the elderly. Untreated the mortality rate is approximately 20% but drops to 1% with treatment. Identifying what type of atypical pneumonia the patient has is greatly assisted by a history of exposure to birds.

Psittacosis and its relationship to bird exposure has been recognised for over one hundred years. Though initially called *pneumotyphus*, the term *psittacosis* (derived from the Greek word for parrot) was first used in 1892 following cases associated with sick parrots. *Ornithosis* may be a more accurate term as there is a potential for all birds to spread the infecting organism, *Chlamydia psittaci*. This term would not be all inclusive, however, as lower mammals have on occasion been sources of disease. Even human transmission has occurred among medical personnel exposed to untreated patients but so rarely (and possibly confused with *Chlamydia pneumoniae* - see later) that respiratory isolation is not warranted. It is principally psittacine birds (parrots and parakeets) which transmit the disease but poultry (mostly turkeys), finches, sea birds and pigeons do so less often. Infected birds may be asymptomatic or obviously sick. Carriage rates of *C.psittaci* in various bird populations have been reported from 5% to 8% but can approach 100% when stress, ie

shipping, crowding and breeding are factors. Discharge from the beak, eyes, faeces, urine and secondarily dust from the feathers are infective. Inhaling the desiccated discharge from the above, including the dust from the feathers, establishes transmission. One can quite vividly envision the aerosolisation caused by spreading the wings of a dead bird, ie should the lorikeet have been the offending reservoir in this case. The finch and pigeon are also suspect and the chickens less so. Most cases occur in owners of pet birds (parrots), but it is obviously an occupational hazard for pet shop employees, pigeon fanciers and poultry raisers.

Culture of *C.psittaci* is dangerous and requires a specialised laboratory, therefore diagnosis is usually made by detecting a four-fold or greater rise in complement-fixing (CF) or fluorescent antibody titre to group antigen. The CF test is only genus specific and does not distinguish *C.psittaci* from *C.trachomatis* or *C.pneumoniae* infections and clinical correlation is important. Treatment of choice is tetracycline (or doxycycline) given for 10-14 days after the temperature returns to normal. Erythromycin is the recommended alternative drug and though studies are not available specifically for roxithromycin, it is a related antibiotic and may well be adequate. Clinical improvement and defervescence is usually seen by 48 hours post treatment. Complete clearing of chest x-ray findings have taken 6 to as long as 20 weeks to resolve.

Prevention includes educating the public regarding exposure to infected birds, ie household pets, at the workplace or other. Handling of dead birds should be avoided. Regulation of the importation, raising and selling of psittacine birds is necessary. Surveillance of pet shops or aviaries, etc epidemiologically linked to human cases is required. Infected birds can be treated with tetracycline or destroyed and thorough cleaning and disinfection of the involved area must follow. The chickens in this case are the least likely suspects but are under surveillance. Prevention may also include bells for cats.

Psittacosis/ornithosis was 'officially' removed from the National Notifiable Diseases list in 1995 (though reports are still printed). It was removed from the NT list also in 1995. Nationwide notification of psittacosis/ornithosis with the exception of NSW was 85 cases or 0.7/100 000 population in 1994 with similar numbers over the previous four years. The cases were aged between 5 and 85+ years with the highest rate reported for males in the 60-64 years age group. Cases reported in the NT from 1991, 1992, 1993 and 1994 are 2, 1, 3 and 0 respectively with one case aged one year and the others between 45 to 50 years of age. The NT will look at re-establishing psittacosis/ornithosis as a laboratory notifiable disease.

References

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Report of a urine screening program for gonorrhoea and chlamydia conducted in a remote NT Aboriginal community in 1995

Steven Skov, Tri-State STD/HIV Project, Alice Springs.

The Tri-State STD/HIV Project (TSP) visited a remote NT Aboriginal community at the invitation of the local community controlled health service to assist in a urine screening program in late 1995. The visit was arranged after discussions with the local health team who consulted with and obtained permission from the health council and the community council. The health council has approved the publication of this report on the condition that the community not be identified.

Methods

All people, male and female, over the age of twelve years who were in the community at the time were offered a urine test. Each person was asked by local staff to give approximately 30-40 ml of first void urine in a sterile collection jar. The urine was tested for leucocytes, nitrites, protein, sugar and blood with a Combur-10 dipstick. The results of all urinalysis were notified to clinic staff for appropriate follow-up. Men's urine was subjected to culture for gonorrhoea and polymerase chain reaction (PCR) for gonorrhoea and chlamydia while women's urine was only tested with PCR. The literature demonstrates reasonable sensitivities for culture of gonorrhoea in men's but not women's urine.

Positive results were reported to a nominated male or female staff member as appropriate at the clinic as soon as they were to hand. Clinic staff were responsible for further investigation, treatment, contact tracing and follow-up. Treatment for both gonorrhoea and chlamydia according to standard protocols was offered to all clients. Partners of infected persons were offered the same treatment. Formal STD notifications were done by the TSP.

Results

A total of 203 people were tested: 112 males and 91 females. Of these, 177 were tested over a two day period with another 26 males being tested in the following week. According to local health service figures, this represents approximately 70% of the men and 50% of the women in the community.

As in Table 1 thirty-one people (15.3%) were infected with either gonorrhoea or chlamydia: sixteen males (14.3%) and fifteen females (16.5%). Table 2 shows the distribution of those infected.

Table 1 People testing positive for gonorrhoea and chlamydia

	Males	Females	All
Gonorrhoea only	6 (5.4%)	4 (4.4%)	10 (4.9%)
Chlamydia only	6 (5.4%)	7 (7.7%)	13 (6.5%)
Both	4 (3.5%)	4 (4.4%)	8 (3.9%)
Either	16 (14.3%)	15 (16.5%)	31 (15.3%)

The bulk of the testing (177 specimens) was done on a Monday and Tuesday. By this time the majority of people who were in the community at the time were offered a test. Specimens were driven back to Alice Springs on Tuesday night and were in Perth for processing by Wednesday afternoon. All results from these specimens were available to clinic staff by Friday afternoon. Clinic staff were able to treat all but two infected men and all but three infected women by the following Tuesday. The other two men and one extra woman were treated in the following two weeks and the final two infected women were not able to be found.

Table 2 The age distribution of those infected with gonorrhoea and/or chlamydia

Age	12-14	15-19	20-24	25-29	30-34	35-39	>39	u/k	Total
males n=112	0	3 (18.8%)	3 (18.8%)	2 (12.5)	1 (6.3%)	1 (6.3%)	4 (25%)	2 (12.5%)	16
females n=91	1 (6.7%)	4 (26.7%)	3 (20%)	2 (13.3%)	1 (6.7%)	1 (6.7%)	1 (6.7%)	2 (13.3%)	15

All except one man consented to having HIV and syphilis serology tests as part of their treatment and follow-up. A total of twenty seven people were named as sexual partners of infected persons. No information is available as to the number of these people investigated or treated.

Discussion

The health staff did extremely well in liaising with the community and conducted the screening in a highly efficient fashion. The proportion of people tested was very similar to that of most other communities where urine screening programs have been conducted.

The rate of infection was also very much in keeping with that found in other communities. Male urine screening programs conducted last year by Nganampa Health Council revealed prevalences of infection ranging from 15% to 24% in different communities and 19% overall (1). It is possible however, that the prevalence of infection observed in this community is a small under-estimate. An examination of the age distribution of those tested reveals that in certain key age groups the proportion tested was rather lower than expected and that seen elsewhere. The proportion of people screened in the 20-34 year age group was between 33% and 50% of the total of people in those five year age groups in the community. In other communities between 50% and 65% of persons in these age groups were tested. Throughout the region some 56% of infections have been found in 20-34 year olds compared to only 39% (Table 2) in the program described here. Apparently, a large number of people in this age range were in Alice Springs at the time of the program. It is possible that had a larger proportion of this age group been tested, the overall rate of infection would have been somewhat higher.

This is the first time that urine screening in women in this region has been reported. It is interesting to note that the rate of infection was virtually the same in both men and women which one might logically expect to be so. However, the literature on urine PCR tests for chlamydia suggests that they are not as good at detecting infection in women as they are in men. We might therefore have expected to find lower rates of infection in women than men with these tests. To understand the

situation better we would need to know more exactly what the sensitivity of these urine tests are in our region; for women especially.

The local health team did extremely well in rapidly treating those people identified as infected. The great majority of people were treated within eight days and all but two people were treated. This was an outstanding result and by far the best of all communities so far. In other communities about 18% of infected persons were not able to be found for treatment and the *average* time between testing and treatment was three weeks. This aspect of the program is extremely important as once people with STDs are identified, it is crucial that they be treated and offered safe-sex education as soon as possible. Literally each day a person remains untreated could result in another person being infected.

The staff also did very well in offering infected persons full investigations for STDs. All but one man also had syphilis and HIV serology as part of follow-up. This is again the best performance in the region and is well in excess of the overall average of 27% of infected persons having these investigations.

The success of the local health team in being able to test and treat a large number of people in a short period of time was due to their relationship with the local health and community councils. People in the community were well informed of what the purpose of the program was and how it would be conducted. The Aboriginal Health Workers in particular were crucial to liaison with the community both in the consultation phase and the conduct of the program. As a result the local health team were able to rapidly identify and treat twenty-nine people who were infected with either gonorrhoea or chlamydia. This should directly prevent a number of cases of pelvic inflammatory disease and infertility. It should also result in a reduction in the number of new infections that would have occurred had these people not been diagnosed and treated.

Reference

1. Skov S, Miller P, Hateley W, Bastian I, Davis J, Tait P, Coppola A. Urine screening for gonorrhoea and chlamydia in central Australia. *CARPA Newsletter* November 1995 pp 61-65.

The Tampon Study Moves to Phase 2

Frank Bowden and Barbara Paterson, AIDS/STD Unit, Disease Control, Darwin.

Progress in the study to investigate the acceptability and accuracy of using self-administered tampons to diagnose STDs in women has been rapid. After 6 months over 500 women had been enrolled and the acceptability of the technique was greater than 90%. The majority of women who had never used tampons still found the technique acceptable. As a result of the study there has been a marked increase in the demand for screening for STDs by women in many rural and remote communities. By itself, this represents a successful outcome.

From a technical point of view, the method has been shown to be more sensitive in detecting gonorrhoea, chlamydia and trichomoniasis than conventional swabs (see table). It must be noted that the conventional diagnostic assays used were not PCR-based and therefore the differences in detection rates will be less marked when the tampon PCR method is compared with conventional swab PCR methods. (This study is currently being undertaken). Nevertheless the tampon method offers great convenience for both practitioner and patient and is highly sensitive and specific.

The tampon method is a screening test for the diagnosis of STDs in asymptomatic women. It does not remove the need to perform a full external and internal examination of women who present with symptoms and signs of an STD or with pelvic inflammatory disease. Pap smears must still be performed 2 yearly. Furthermore, the PCR tests do not

give information about antibiotic sensitivity and so it is essential that culture for gonorrhoea continues at sentinel sites (e.g Clinic 34 and nominated rural health centres) and in all patients presenting with obvious signs of cervicitis (and in men urethritis).

Phase 2 of the study

Since the study was designed there has been increasing experience with the PCR diagnosis of chlamydia (and to a lesser extent gonorrhoea) in first void urine samples in men. Several studies have also been done in women and the results are comparable with conventional testing. While we have shown the tampon method to be acceptable it would be even simpler if urine was found to be as sensitive as the tampon method in women. For this reason we have now moved to Phase 2 of the study. Any woman presenting for an STD check-up is asked to give consent to self-administer a tampon and to give 30 mls of first void urine. The results of the two tests are then compared. So far over 200 women have been enrolled in this phase of the study.

If you would like to take part in the study please contact: Dr Barbara Paterson or Dr Frank Bowden on (08) 8922 8007 and we will send you the consent forms and specimens required. Western Diagnostics, Peverill's Pathology and Royal Darwin Hospital are all co-operating in this study and will co-ordinate the transport of specimens to the laboratories involved. Reports are returned to the requesting practitioner in the normal way.

Table: Comparison of Tampon PCR testing with conventional testing

	Chlamydia	Gonorrhoea	Trichomonas
Percentage of conventional tests positive*	2.9%	0.8%	8.5%
Percentage of tampon PCR tests positive	5.4%	8.3%	15.2%
Total # tests done	26	454	52

* Conventional tests for *C.trachomatis* = endocervical swab processed by DNA probe (Gen-Probe® *N.gonorrhoeae* = endocervical swab cultured on standard gonococcal media (NYC and Thayer-Martin) and *T.vaginalis* = one or more of the following: Pap smear, culture from high vaginal swab or microscopy of wet preparation.

• Discordant tampon specimens (i.e conventional test negative but tampon PCR positive) were confirmed as true positives by separate PCR primer sets in 11 of 12 chlamydia samples, 40 of 48 gonorrhoea samples and 31 of 32 trichomonas samples.

NT NOTIFICATIONS OF DISEASES BY DISTRICTS
1 APRIL TO 30 JUNE 1995 AND 1994

DISEASES	ALICE SPRINGS		BARKLY		DARWIN		EAST ARNHEM		KATHERINE		TOTAL	
	'96	'95	'96	'95	'96	'95	'96	'95	'96	'95	'96	'95
Adverse Vaccine React.	2	0	0	2	3	0	0	0	0	0	5	2
Arbovirus infections												
Barmah Forest Virus	1	0	0	0	4	2	2	0	0	2	7	4
Dengue	0	0	0	0	1	1	0	0	0	0	1	1
Ross River Virus	0	24	4	2	17	29	1	13	2	8	24	76
Campylobacter	3	33	2	1	51	55	0	1	9	3	65	93
Chlamydia	48	32	5	3	53	66	22	13	35	23	163	137
Cong. Syphilis	0	1	0	0	0	0	0	0	1	2	1	3
Donovanosis	3	4	1	0	0	3	1	0	0	4	5	11
Gastroenteritis	0	0	0	0	0	1	0	0	0	0	0	1
Glomerulonephritis	0	0	0	0	0	9	0	18	0	6	0	33
Gonococcal Disease	74	62	7	6	29	28	23	7	40	19	173	122
Gonococcal Conjunct.	0	0	0	0	0	0	1	0	0	1	1	1
Haemophilus Inf type b	0	0	0	0	0	0	0	0	0	1	0	1
Hepatitis A	3	2	1	0	10	2	2	0	6	8	22	12
Hepatitis B	2	1	0	0	0	0	0	1	1	1	3	3
Hepatitis C (incidence)	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis C (prevalence)	9	3	1	0	62	58	0	0	2	1	74	62
HIV infections	0	0	0	0	3	0	0	0	0	0	3	0
HTLV-1	9	0	1	0	0	0	0	0	1	1	11	1
Legionnaires Disease	0	0	0	0	0	1	0	0	0	0	0	1
Leprosy	0	0	0	0	2	0	2	0	0	0	4	0
Malaria	1	0	0	1	4	11	0	0	0	1	5	13
Measles	0	1	0	0	0	6	0	11	0	0	0	18
Meningococcal Infect.	0	0	0	0	1	0	1	1	0	0	2	1
Mumps	0	0	0	0	1	1	0	0	0	0	1	1
Pertussis	2	3	9	0	0	20	0	9	0	8	11	40
Pneumococcal Disease	3	10	2	0	5	6	0	1	2	5	12	22
Rotavirus	14	14	5	0	12	13	0	0	6	6	37	33
Rubella	0	0	0	0	1	4	0	0	0	0	1	4
Salmonella	20	14	11	6	51	48	8	9	18	21	108	98
Shigella	9	18	2	3	7	13	4	12	5	1	27	17
Syphilis	17	59	0	0	10	7	11	8	11	23	49	47
Tuberculosis	2	0	0	0	4	12	0	0	2	1	8	13
Total	222	281	51	24	331	397	78	104	141	146	823	952

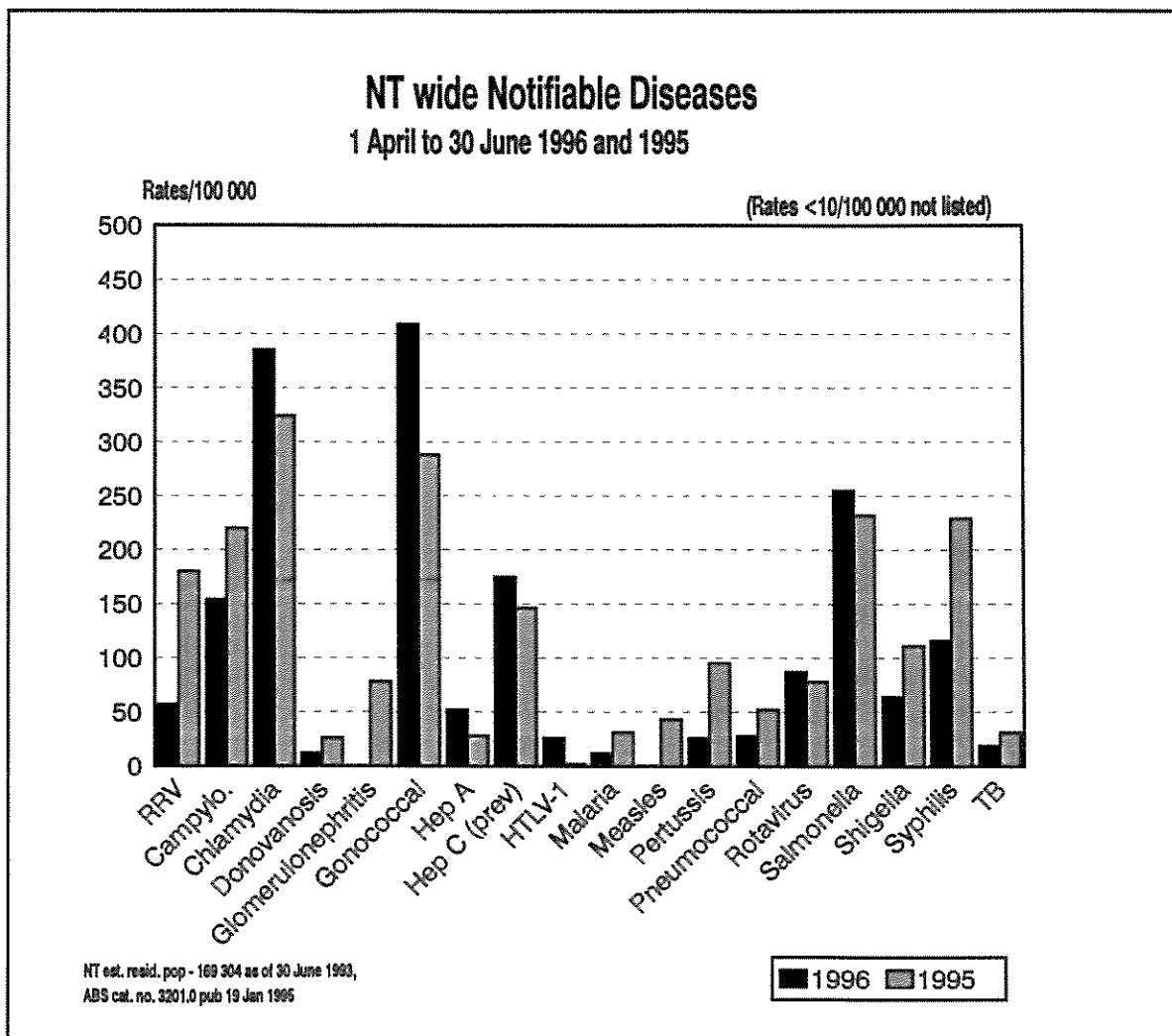
Points to note regarding notifications:

- Acute Rheumatic Fever, Australian Encephalitis (MVE, Kunjin), Amoebiasis, Botulism, Brucellosis, Chancroid, Cholera, Congenital Rubella Syndrome, Diphtheria, Hepatitis D and E, Hydatid Disease, Leptospirosis, Listeriosis, Lymphogranuloma venereum, Poliomyelitis, Typhoid, Typhus, Yersiniosis, and Viral Haemorrhagic Fever are all notifiable but had "0" notifications in this period.
- Syphilis notification rates throughout the NT have decreased again in the second quarter of 1996. Syphilis rates often fluctuate due to their dependence on screening but these activities have actually increased over the past two years and so the figures probably represent a true decrease in the incidence of disease.
- Gonorrhoea and chlamydia notification rates are higher in the second quarter of 1996 as compared to the same period in 1995. The major contributions to this increase in screening are from East Arnhem and Katherine regions where there has been a marked increase in screening activity for these two conditions. In addition, the introduction of polymerase chain reaction (PCR) technology for the detection of chlamydia has affected notifications. A proportion of the increase in notifications can be explained by the fact that PCR is significantly more sensitive than conventional testing (see Tampon study article in this issue).
- Notification data always under-represents the true incidence of donovanosis and it is difficult to interpret the lower rate of notification for this quarter. However, it is hoped that the introduction of azithromycin as the first-line treatment of the condition is truly reducing the incidence and prevalence of the disease.

Notified cases of Vaccine Preventable Diseases in NT by Report Date 1 April to 30 June 1996 and 1995

DISEASES	TOTAL		No. cases among children aged 0-5 years	
	'96	'95	'96	'95
Congenital rubella syndrome	0	0	0	0
Diphtheria	0	0	0	0
Haemophilus influenzae type b	0	1	0	1
Hepatitis B	3	3	0	0
Measles	0	18	0	8
Mumps	1	1	0	0
Pertussis	11	40	2	12
Poliomyelitis, paralytic	0	0	0	0
Rubella	1	4	0	3
Tetanus	0	0	0	0

• Mumps is largely under-reported.



MALARIA NOTIFICATIONS, NORTHERN TERRITORY

April to June 1996

Compiled by Peter Knibbs, Disease Control, Darwin.

Seven notifications of malaria have been received for the second quarter of 1996. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemoprophylaxis was used.

ORIGIN OF INFECTION	REASON EXPOSED	AGENT	CHEMO-PROPHY-LAXIS	COMMENTS
PACIFIC				
PNG	Visiting family	<i>P. vivax</i>	Yes	Took weekly chloroquine for first 4 weeks of visit only
PNG	Voluntary service	<i>P.falc/vivax</i>	Yes	Self treated with chloroquine while in PNG
PNG	Holiday	<i>P.vivax</i>	Yes	Third relapse despite adequate primaquine previously
PNG	Missionary	<i>P.falciparum</i>	No	Lived in PNG for 5 years with no infection
ASIA/SE ASIA				
Indonesia	Holiday	<i>P.vivax</i>	Yes	Diagnosed five months after return from Indonesia
Indonesia	Travelling	<i>P.vivax</i>	Yes	Took paludrine for the first 3 months of travelling
Indonesia	Diving holiday	<i>P.vivax</i>	Yes	Patient told that symptoms were the flu by GP

1996 DISEASE CONTROL WORKSHOP

Knotts Crossing Resort - Katherine NT.

Day 1: Tuesday 8th October

Topic	Presenter
Control of Glomerulonephritis Outbreaks in the Top End	Fay Johnston
Trachoma Treatment Program: Katherine region	Tania Wallace Renee Reeves
'Best Practice Standards of Care for Diabetes'	Tarun Weeramanthri
TB in Central Australia	Nick Williams Olive Aumann
TB Screening in NT 10-14 year olds Targeting those at risk School screening in the future	Jo Wright Vicki Krause Lyn Barclay Tania Wallace
Community TB Screening: How is it done? What is needed?	Vicki Krause Terry O'Brien Olive Aumann
Pneumococcal Vaccination Program:	Chris Evans Marg Cooper Alyson Alway Gill Campbell Sarina White

Day 2: Wednesday 9th October

Topic	Presenter
Childhood immunisation coverage in the NT: How are we doing?	Angela Merianos
Hypothetical	Nan Miller Angela Merianos
Hepatitis B: NHMRC future vaccination policy Booster policy for health care workers	Nan Miller
New vaccines on the horizon	Nan Miller
Leprosy: Introducing revised policy & practical session	Sarah Huffam Nilva Egana Vicki Krause Tania Wallace
Melioidosis The last 6 years in the NT	Bart Currie
Epidemiology session 'The Use and Abuse of Surveillance Data'	Angela Merianos
Tampon Study - update	Barbara Paterson
'In House' Matters (closed session)	Disease Control staff

Day 3: Thursday 10th October

Topic	Presenter
HIV treatment: Update on publicised methods	Frank Bowden
Regional STD Control: What are the issues?	Steven Skov
Discussion on the Role of Educators	Trevor Woodhead
The use of PCR in Donovanosis	Monique Taylor
PCR issues: What have we learnt from it all?	Frank Bowden
STD Treatment Protocol: Update & discussion	Jan Savage Cate Coffey
Public health implications of hepatitis C & the issue of needle exchange and distribution	Sue Dubow
Quiz!	Frank Bowden

PROFILES AND STAFF UPDATES

Alice Springs
Nick Williams

Medical Officer - Disease Control

Nick was a District Medical Officer (DMO) in Alice Springs for four and a half years, the last two as Senior DMO. He has recently returned from one year working in an indigenous Cree community in northern Manitoba, Canada.

Alice Springs
Alyson Alway

Project Officer - Pneumovax Program

Alyson is the newly appointed Pneumovax Program co-ordinator. Her experience ranges from recent Remote Area nursing in Oenpelli, to working on a Women's Health project for Congress Alukura and also as an independent midwife.

Alice Springs
Paula Perkins

Administration Officer - Pneumovax Program

Paula has lived in Alice Springs for seven years and is currently the Administration Officer for the Pneumovax Program. She is very versatile and enthusiastically takes on a vast array of administrative duties above and beyond the Pneumovax Program.

Katherine
Ann Burton

Medical Officer - Disease Control

Ann recently commenced as the new Medical Officer in Disease Control, after spending six months working as a DMO for Rural Health in Katherine. Prior to this, she was in General Practice in Sydney, NSW.

Darwin

Tania Wallace

Leprosy/TB Medical Officer - Disease Control

Tania left Katherine Disease Control in June and is now working in Darwin as the Leprosy/TB Medical Officer.

Darwin

Nilva Egana

Public Health Nurse - Leprosy/TB Control

Nilva is currently on transfer from RDH replacing Philip McMahon in Leprosy/TB Control, whilst he is on long service leave.

Darwin

Marcia Russell

Education Officer, AIDS/STD Unit

After teaching for two and a half years at Sanderson High School, Marcia has opted for a change in focus and brings her education background to the AIDS/STD Unit.

Departures:

Tennant Creek

Dianne Banner

Public Health Nurse - AIDS/STD
to WA

Darwin

Doug Lush

Leprosy/TB Medical Officer
to USA

Darwin

Sue Smith

Education Project Officer
to Victoria

