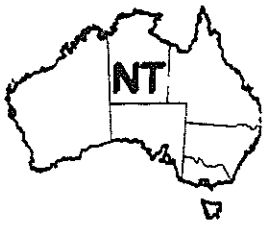
TERRITORY HEALTH SERVICES
Centre for Disease Control

THE NORTHERN TERRITORY
COMMUNICABLE DISEASES BULLETIN



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Childhood immunisation uptake in the NT: Part 2 - Central Australia

Angela Merianos, CDC, Darwin

This article concludes the two part series on immunisation coverage rates in the NT. The first part presented data from the Top End and discussed its limitations.

The same limitations apply to Central Australia but appear to be of even greater magnitude for the following reasons:

1. Both the Alice Springs Urban and Alice Remote databases crashed on regular occasions before the system was reviewed in 1995. These system failures resulting in an unknown amount of data loss and corruption.
2. Until recently, there has been no standardised data handling process applying to the Urban and Remote datasets, particularly with respect to registering newborns at the Alice Springs Hospital resident outside Alice Springs District.
3. As with other Districts, mobile children appear on both the Alice Springs Urban and Remote datasets so that records are fragmented. A search for duplications was carried out before these datasets were analysed.
4. The currency of the Barkly dataset is limited by the slow turn-around time of records from some of the vaccine providers in the District.

Results

Tables 8-11 present NT immunisation coverage rates in Central Australia by year of birth and District.

Unlike the situation in the Top End, coverage rates are similar across datasets in the Centre. Age-appropriate immunisation uptake for children 0-6 years in all datasets varies little between the NT and NHMRC Immunisation Schedules with coverage rates of approximately 70%.

In the Alice Springs region overall, 72% of children had completed the primary series of three DTP injections and 51% had received the 18 month booster dose. The rates are similar for OPV as expected. The slightly lower value for OPV4 may reflect the change from administration at 18 months to 5 years. 71% of children had received at least one dose of Hib vaccine and 50% of children born since 1993 had received 3 doses. 63% of children had received 3 doses of hepatitis B vaccine since 1990. Only 68% of age-eligible children have a MMR recorded on the database.

Contents

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series of three DTP injections and 48% had received the 18 month booster dose. Again, the rates are similar for OPV. 68% of children had received at least one dose of Hib vaccine and 51% of children born since 1993 had received 3 doses. 63% of children had received 3 doses of hepatitis B vaccine since 1990. Only 74% of age-eligible children have a MMR recorded on the database.

Discussion

Although the NT has demonstrated immunisation coverage rates well above the 53% quoted for children 0-6 years nationally, there is no room for complacency. The NT still has a long way to go to reach the NHMRC goals and targets for immunisation ie 95% or higher for all childhood vaccines. These levels of coverage are required to stop transmission of most of the vaccine preventable diseases.

It remains to be seen whether the coverage rates presented here truly reflect immunisation uptake across the NT. Only by achieving full participation of NT vaccine providers in data collection and regular reporting will we be able to use these data as a program evaluation tool with any certainty. In spite of these concerns, the review of these datasets has already achieved recognition of the importance of accurate and systematic work practices in the documenting and reporting of immunisations by vaccine providers and data entry officers, and the timely flow of information between providers and the central registers. In the world of information technology, "Garbage In equals Garbage Out (GIGA)". A quality assurance protocol is being adopted across the NT to standardise the way in which data are collected and ensure accuracy. If data quality is not improved, the time, effort and commitment of nurses, Aboriginal Health Workers and doctors to immunising NT children will be unsupported by the data and will leave their immunisation programs open to criticism.

Table 8

Alice Urban

	VACCINATION COVERAGE (%)																0-6 YRS	
	BCG	DTP1	DTP2	DTP3	DTP4	OPV1	OPV2	OPV3	OPV4	HIB1	HIB2	HIB3	HB1	HB2	HB3	MMR1	NT TOTAL	NHMRC
YOB																		
89	0	92	83	76	62	93	86	78	63	26	NA	NA	18	17	15	65	73	73
90	32	85	81	77	63	86	82	80	66	42	NA	NA	36	31	26	75	64	74
91	36	89	83	78	61	90	87	83	66	38	NA	NA	79	74	67	75	75	75
92	44	90	85	77	40	91	87	80	42	62	NA	NA	88	83	72	66	74	72
93	44	81	73	65	21	81	74	66	19	80	70	46	88	79	60	51	64	60
94	26	84	72	65	51	86	75	67	7	86	74	59	91	83	58	59	68	65
95	41	89	82	71	71	90	83	72	NA	88	81	64	87	80	61	65	77	78
96	53	100	94	95	NA	101	95	98	NA	100	92	NA	90	87	86	NA	94	97
Total	39	88	81	73	49	89	83	76	41	66	77	56	80	74	60	66	71	70

Table 9

Alice Remote

	VACCINATION COVERAGE (%)																0-6 YRS	
	BCG	DTP1	DTP2	DTP3	DTP4	OPV1	OPV2	OPV3	OPV4	HIB1	HIB2	HIB3	HB1	HB2	HB3	MMR1	NT TOTAL	NHMRC
YOB																		
89	95	91	91	91	73	91	91	91	77	36	NA	NA	95	91	86	91	85	82
90	91	92	88	85	72	92	88	85	73	37	NA	NA	95	89	80	85	82	80
91	89	90	85	81	67	90	85	82	69	57	NA	NA	94	87	79	80	81	79
92	86	86	82	77	63	86	83	78	63	89	NA	NA	95	83	77	75	80	78
93	91	90	86	77	59	90	86	77	59	121	80	47	96	87	75	76	81	79
94	83	80	75	66	44	80	75	66	40	81	70	49	90	75	64	61	60	66
95	82	77	67	53	34	78	66	52	NA	77	61	40	92	71	51	57	64	60
96	82	67	50	32	NA	66	50	31	NA	63	48	NA	83	53	29	50	54	51
Total	86	84	78	71	59	84	78	71	58	77	65	46	93	79	69	72	73	70

Table 10

Alice Springs District

	VACCINATION COVERAGE (%)																0-6 YRS	
	BCG	DTP1	DTP2	DTP3	DTP4	OPV1	OPV2	OPV3	OPV4	HIB1	HIB2	HIB3	HB1	HB2	HB3	MMR1	NT TOTAL	NHMRC
YOB																		
89	95	92	85	78	64	93	87	80	66	28	NA	NA	32	30	27	70	74	74
90	91	88	84	80	66	88	85	82	69	40	NA	NA	61	55	49	79	71	76
91	89	89	84	79	63	90	86	83	67	44	NA	NA	84	78	71	77	77	76
92	86	88	84	77	49	89	85	79	50	73	NA	NA	91	83	74	69	76	74
93	91	85	78	70	37	85	79	71	36	98	74	46	92	82	67	62	71	68
94	83	82	73	66	48	83	75	67	23	83	72	54	91	79	61	60	68	66
95	82	84	75	63	30	84	76	63	NA	83	72	46	89	76	57	61	68	67
96	82	87	76	68	NA	87	77	69	NA	85	74	NA	87	73	62	NA	77	78
Total	86	86	80	72	51	87	81	74	46	71	73	50	85	76	63	68	71	70

Table 11

Barkly Total

	VACCINATION COVERAGE (%)																0-6 YRS	
	BCG	DTP1	DTP2	DTP3	DTP4	OPV1	OPV2	OPV3	OPV4	HIB1	HIB2	HIB3	HB1	HB2	HB3	MMR1	NT TOTAL	NHMRC
YOB																		
89	86	100	100	100	90	100	100	100	90	30	NA	NA	80	80	70	100	91	91
90	80	90	88	84	45	93	91	89	53	30	NA	NA	83	81	73	86	76	75
91	68	94	88	76	53	96	89	78	56	41	NA	NA	77	72	56	75	73	75
92	72	96	85	76	56	98	88	80	58	71	NA	NA	80	75	58	63	75	77
93	68	89	86	81	64	90	86	80	60	81	76	60	91	81	68	77	77	77
94	71	89	75	70	48	90	75	71	29	86	70	49	90	84	70	68	71	68
95	74	89	77	63	19	89	78	64	NA	88	65	46	91	79	56	70	70	68
96	48	86	67	40	NA	88	70	38	NA	85	64	NA	79	64	52	NA	65	67
Total	69	91	82	73	48	92	83	74	51	68	69	51	84	76	63	74	72	71

Immunisation News!

Hepatitis B Vaccine

The Commonwealth Department of Health and Family Services has allocated funding for a national program to immunise pre-adolescent children against hepatitis B. The NT policy of immunising high risk infants since 1988 and all infants since 1990 has positioned us well ahead of other States and Territories. Most children up to the age of six years are already immunised. THS is planning to offer the vaccine to at least all children in the 6 to 10 year age group through a once off catch up program commencing in 1998.

National Immunisation Awareness Campaign

The second half of 1997 will see the introduction of the 'Immunise Australia' a National Immunisation Awareness Campaign. This is part of the Federal Health Minister's seven point plan for improving the immunisation rates in Australia. The awareness campaign will include extensive promotion of immunisation through the media, displays in shopping centres, a 1-800 immunisation information line and the organisation of three National Immunisation Days (NIDs). The NIDs will be held on the first Saturdays of August, October and December and will provide increased access to immunisation services and information.

Diphtheria-tetanus-acellular pertussis (DTPa)

A preparation of DTPa which contains an acellular pertussis component (DTPa) is now available in Australia. Reactogenicity studies have shown that DTPa produces fewer side effects than whole cell pertussis (DTPw). It has been recommended by the NHMRC for use in the two booster doses of DPT given at 18 months and 5 years. As yet there is no specific funding for this vaccine, however THS provides it free to any child who has a contraindication to DTPw. For more information contact Darwin CDC on 8922 8044.

Flu shots for health staff - three good reasons to be immunised

Fay Johnston, CDC, Darwin

The main public health measure to control the impact of influenza is annual immunisation of elderly people and others at higher risk of complications and death because of chronic medical conditions. The health benefits and cost effectiveness of this practice have been clearly established.[1] Studies of the value of immunising healthy working adults against influenza have demonstrated substantial indirect economic benefits mostly due to the reduction in the number of lost work days. Direct health benefits have also been demonstrated but they are less dramatic in this lower risk group.[2,3] Health staff, on the other hand, form a unique subset of working adults because:

1. Their job places them at higher risk of exposure to influenza and other respiratory viruses circulating in the community.

2. They often work closely with and may transmit influenza to patients in high risk categories.

3. Influenza epidemics have the effect of increasing the workload in both hospitals and community health services, while simultaneously reducing the available work force because of illness among staff.

These issues were highlighted by two recent studies conducted in Glasgow.[4,5]

In the first study,[4] 602 hospital workers had blood collected before and after the 1993-4 winter and serological evidence of influenza infection was compared with individual recall of episodes of influenza-like illness. The epidemic of influenza during that season was described as 'mild'. Approximately one quarter of those tested had evidence of influenza infection while the estimated peak incidence in the general community over the same period was less than one percent. Of those with positive serology, 28% could not recall any respiratory infection. The authors concluded that influenza infection among health staff was common and often asymptomatic, and that in this situation cross infection to patients would be likely to occur.

The second study[5] aimed to determine the effectiveness of vaccinating health staff against influenza as a strategy for preventing influenza in elderly patients in long term care. They studied 1029 patients resident in 12 geriatric medical long term care hospitals in Glasgow over the winter of 1994-1995. Six of these hospitals routinely immunised inpatients against influenza and six did not. The hospitals were stratified by their policy for vaccinating their patients and then randomly allocated for the health care workers to routinely be offered either influenza vaccination or not. The uptake of the vaccine among staff was 61%. Vaccination of health workers was associated with a statistically significant lower patient mortality of 10% compared with 17% in the patients cared for by unvaccinated staff. Vaccination of patients in this study did not significantly affect mortality, although the group in which both staff and patients were vaccinated had the lowest mortality overall. The authors concluded that immunising health staff may be the better strategy for protecting elderly patients in the long term and supported the recommendation that health staff in contact with patients in high risk categories should be immunised against influenza.

In conclusion, there is increasing evidence that vaccination of health staff reduces the transmission, complications and mortality due to influenza among high risk patients. There are also benefits for both individual workers and employers in reducing the amount of illness and sick leave due to respiratory viruses. This second issue is particularly important for remote health centres where it can be difficult to arrange relief, and in busy hospital departments such as Accident and Emergency which have a large amount of community contact.

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New Guidelines!

New Guidelines for the Control of Post-Streptococcal Glomerulonephritis are presented below. They will be finally printed in the first week of August. If you have any comments please contact CDC on 8922 8044 before August 1st.

Guidelines for the control of acute post-streptococcal glomerulonephritis

Background

Acute post-streptococcal glomerulonephritis (APSGN) is an inflammatory disease of the kidneys which occurs two to three weeks after skin or throat infection with a particular type of bacteria called group A streptococcus (or occasionally groups C or G streptococcus). In the Northern Territory (NT) most cases follow skin rather than throat infections because skin infections are the more common problem. Not all types of streptococcus cause kidney problems but only those caused by "nephritogenic" strains.

APSGN can cause haematuria, high blood pressure, oedema and poor renal function. It most commonly affects children but can occur at any age. For each clinical case of APSGN there are likely to be three to four cases of subclinical disease. The usual outcome is one of complete recovery however some studies of outbreaks have documented case fatality rates of up to one percent and progression to chronic glomerulonephritis in a similar proportion of cases. The relationship between APSGN and the high rates of renal failure among Aboriginal people in the Top End is unknown at present.

Outbreaks in Aboriginal communities of the NT appear to occur regularly every few years associated with the circulation of a new strain of a nephritogenic streptococcus. In communities with high levels of scabies, skin sores and overcrowded living conditions new strains spread very quickly. There is evidence that outbreaks can be halted by treating all children with any evidence of skin sores with intramuscular benzathine penicillin (also known as LA Bicillin) to stop the transmission of the bacteria in the community. In the absence of any intervention new cases can continue for several months.

Case Definition of APSGN

All four criteria are required

i. Clinically compatible illness with one or more of:

- oedema (swelling of the face or limbs)
- macroscopic haematuria (visibly dark urine)
- high blood pressure (diastolic BP >80, 13 years of age or younger, or >90 if above 13 years).

ii. Microscopic glomerular haematuria

If sent to a laboratory for microscopy: RBC > 10/mm^3, 50% of glomerular origin.

If tested in the community: haematuria of 2+ or more on dipstick urinalysis.

iii. Evidence of recent streptococcal infection

Positive group A Streptococcal culture from skin or throat, or elevated serum ASO or Anti DNAase B titres

iv. Reduced serum complement (C3) level.

A **subclinical case** has the same definition but without any clinical features, ie points two, three and four above only. These cases are only found incidentally when performing investigations for an unrelated reason, or by screening for APSGN.

Control of APSGN

1. Prevention

Control of scabies and skin sores

In the NT, scabies infestation is the major cause of infected skin sores that carry the streptococcus. To help prevent epidemics of APSGN:

- promote community control of scabies and skin sores,
- promote regular washing, especially of children, to decrease spread of the bacteria; and
- treat skin sores with a single intramuscular dose of benzathine penicillin.*

For further information see THS *Children's Standard Treatment Manual* 1995, page 179 and *Draft Guidelines for the Control of Scabies and Skin Sores*, CDC, 1997.

Improved housing

Housing construction and maintenance are beyond the direct control of health centres staff. However, it is important that health staff support initiatives that improve housing, reduce overcrowding and subsequent overuse of household facilities as these are all major contributing factors in the spread of all communicable diseases.

2. Sporadic (single) clinical cases of APSGN

Single cases may or may not indicate the beginning of an outbreak. All suspected cases should be discussed with a doctor and notified by telephone to Disease Control (CDC). Blood and urine need to be sent to a laboratory to confirm the diagnosis. Some cases will

require admission for management of high blood pressure and sometimes renal failure. All cases should be followed up by the doctor and have a blood test six to eight weeks later to confirm the C3 level has returned to normal (see *THS Children's Standard Treatment Manual* 1995, page 220).

Prevention of further disease following a single case:

Give an injection of benzathine penicillin* to:

- all household and other close contacts in the 3-15 year age group,
- all close contacts with any skin sores regardless of their age; and
- treat scabies as required.

3. Community outbreaks

Definition

2 clinical cases of APSGN in one week

or

3 clinical cases of APSGN in one month

Action

Community wide treatment may be required to halt an outbreak. The decision to withhold, delay or commence community wide intervention depends on the size of the community and if the cases are unrelated or epidemiologically linked. This should be discussed with CDC who may be able to provide additional staff to help with a large intervention.

Outbreak intervention

- Community education about the problem particularly including health staff, parents and teachers.
- Treat all household contacts of clinical cases in the 3-15 year age group, and all other household contacts with sores with IM benzathine penicillin* (as described above in the section about single clinical cases).
- Treat all children in the community up to 15 years old with any evidence of skin sores with benzathine penicillin.*
- Treat scabies as required.

Sores may affect over 50 percent of children in a community. As a rough estimate, the total community population divided by four will give a guide to the number of doses of penicillin that may be required.

Most interventions are done in co-operation with teachers to find and treat children at school. Parents often bring younger children to the health centre if there has been good publicity about the problem, otherwise door to door household visits may be the only way to find and treat children who do not go to school.

Remember that scabies and skin sores should be treated even without an outbreak of APSGN. The intervention gives the opportunity to enhance standard treatment, halt an epidemic and provide education about scabies, skin sores, APSGN and how to prevent the spread of infections (see prevention above).

Dosage table for benzathine penicillin*

Weight	Dose of benzathine penicillin (LA Bicillin)
10 to 15 kg	1 ml
15 to 20 kg	1.5 mls
20 kg or more	2 mls

From *Antibiotic Guidelines* 1996-1997. Victorian Medical Postgraduate Foundation; 9th ed.

*Those allergic to penicillin should receive appropriate alternative treatment such as oral erythromycin, twice daily for ten days. Check recommendations in *Antibiotic Guidelines*.

For further information:

Centre for Disease Control (CDC), Darwin

Ph: 8922 8044

Fax: 8922 8310

The Guidelines for Community Control of Scabies and Skin Sores will be published in the next edition of the *Bulletin*. We are still seeking input on these, particularly from staff in remote communities. Contact CDC on 8922 8044 if you would like to receive a draft copy now for review.

Management of patients in hospital with crusted scabies

Sarah Huffan, Daniel O'Brien and Bart Currie,
Infectious Diseases Unit, Royal Darwin Hospital.

General measures

- Single room isolation. Staff to wear long sleeved gowns, gloves and overboots.
- Arrange for clothes to be laundered in the hospital laundry.
- Daily sweeping of the room followed by spraying with an insecticide surface spray.
- Arrange for household contacts to be treated and house cleaning followed by insecticide "bombing" (eg. with permethrin 10g/kg) of each room in the patient's house (usually with help of the community health centre staff).

Baseline investigations

- Skin scrapings for microscopy for sarcoptes scabiei.
- Blood for: FBC, ESR, UEC, BSL, LFT, CRP, HIV Ab, HTLV-1 Ab.

  Immunoglobulins including IgE, Compliment - C3, C4, T cell subsets, ANF.
- Consider skin swab for microscopy and culture if indicated, blood culture if febrile.

Specific therapy

- Topical permethrin 5% application; supervised to entire body surface including scalp, ears, neck and eyebrows but excluding the face and mucus membranes. Permethrin to be left on overnight and washed off in the shower the following morning.
- Use 2-3 applications of permethrin in the first week (eg. days 1,3 and 6).
- Topical keratolytic: eg. urea 10% + lactic acid 5% (*Calmurid*) applied once or twice daily on the days permethrin is not applied.
- Consider ivermectin in severe and refractory crusted scabies infections.
- Intravenous or oral antibiotics where appropriate for secondary bacterial infection.

Management after the first week depends on clinical progress and results of repeat skin scrapings. Weekly permethrin 5% and daily urea 10% + lactic acid 5% cream is usually required for several weeks or longer. Regular review and assessment of household situation is recommended to ascertain response and for early identification of recrudescence or reinfection.

Nutrition and infection in Aboriginal children

Alan Ruben, Community Paediatrician, CDC, Darwin
Presented at the Heinz International Nutrition Symposium, Melbourne 2 May, 1997

Setting the scene

This paper focuses on the health and nutrition of Aboriginal children from the tropical Top End of the Northern Territory (NT), although the problems seen are typical for Aboriginal children all over remote areas of Northern and Central Australia. While acknowledging the underlying causes of the problems, it is not within the scope of this paper to address these and other important issues.

The rural areas of the Top End are sparsely populated with only 15,000 residents of whom over 60% are Aboriginal. The majority of Aboriginal people live in one of eighteen main communities or their surrounding outstations. The communities vary in size from outstations with only one extended family, to communities which may have over 2,000 residents, depending on the season. Although the communities are located on Aboriginal land there is often just one family, tribe or clan to whom the land is the traditional area. The remainder of residents are essentially guests who will have their own land elsewhere; this has relevance to the rights of use and access to facilities on the land itself. In contrast outstations are usually located on the traditional land of the residents.

The communities were generally established by missionaries (often at the request of government) between 1900 and 1960, partly for the purpose of proselytising but also to provide an alternate to the urban drift which was seen as unhealthy. Some communities were established specifically to house children of mixed descent, the "stolen generation". Although church influence in some communities remains strong, all communities now have a comparable local government structure to other towns in the NT and Australia.

It is difficult to categorise life on an Aboriginal community. While the poverty is extreme compared to non-Aboriginal Australia it would be incorrect to describe the conditions as third-world. Humpies are the exception, not the rule. The great majority of communities have a clean reticulated water supply, sewerage and electricity in each house. There are shops for food and general provisions. There are health centres, schools and churches. Most people live in communities with resident teachers, nurses, doctors and health workers and their numbers are increasing.

Underlying this seeming order is a form of anarchy that is unique in Australia. There are too few houses and the consequential gross overcrowding places strains on systems for which they were not designed. The sewerage cannot cope with the house occupancy and the climate. In the shops the quality of the food, especially fresh food, is poor and prices the highest in Australia. The Health Centres vary in greatly quality and are often short staffed. Regular primary school attendance is less than 50% in most communities with literacy levels falling over the past 25 years. Overall health and education staff turnover exceeds 50% per year, over 100% in some communities. On top of this, unemployment or underemployment, with no prospects for change in the near future, is the norm and coupled with the toll of alcohol and Kava abuse it is perhaps not surprising that the health and nutrition of children is poor.

Nutrition and infection in Aboriginal children

Worldwide the interaction between nutrition and infection is well recognised.[1] The same interactions are true for Aboriginal Australia but perhaps under appreciated by those who do not have intimate dealings with Aboriginal people. The recent move to change the term "malnutrition" to "energy malnutrition (starvation)"[2] can only stem from a misunderstanding of a significant cause of nutritional deficiency in Aboriginal children from remote areas of Australia - the anorexic and catabolic effects of infections.

Infection affects nutrition in three ways. Infection may make the child anorexic. Infection will lead to a catabolic state and increase the relative requirement for food. Infections such as diarrhoeal disease may cause an actual loss of absorptive capacity.[1,3,4]

The health problems of Aboriginal children have been well described in the published Australian literature. It has been said that the average Aboriginal child admitted to hospital carries a textbook worth of diseases. We reviewed admissions at the Royal Darwin Hospital for the years 1993-5 inclusive and found that only 20% of Aboriginal children had a single diagnosis, with 60% having two or more concurrently. This compares to the hospitalised non-Aboriginal children where 78% had one diagnosis only.[5] In another study we looked at all hospitalisations of young Aboriginal children over a 12 month period with a primary diagnosis of diarrhoeal disease. We found 32% to also have pneumonia, 60% to have scabies, 24% anaemia, 37% otitis media and 10% a urinary tract infection.[6] Of perhaps most concern 59% of these children were malnourished on World Health Organisation criteria and 20% were microcephalic.[7,8] With significant associations found between malnutrition and microcephaly,[9] we found the risk of hospitalisation for an Aboriginal child with diarrhoeal disease in the first two years of life to be 35% per year, and the risk of malnutrition 21%. The findings of this hospital based study have been confirmed by our more recent unpublished work in communities. In some large communities we found the hospitalisation rate for young Aboriginal children for all causes, after birth, exceeds 100% for each of the first two years of life, with the commonest diagnoses being diarrhoeal disease, pneumonia, malnutrition and anaemia. We found the point prevalence for malnutrition to vary between 5 and 30% for one year old children, depending on community, with rates of stunting in some places exceeding 10% and a mean height-for-age and weight-for-height of under one standard deviation below the mean. Again these children also have high rates of infectious diseases, anaemia and dental caries.

In contrast immunisation rates are very high and as a consequence the rates of vaccine preventable diseases very low.[10,11] However epidemics of post-streptococcal glomerulonephritis occur approximately every 6-8 years and rheumatic fever and its sequelae continues to have the highest prevalence rate in the world.[12,13]

Health problems for Aboriginal children typically start after four months of age, when breast milk supply cannot keep up with growth. In recent times there has not been a tradition to offer children weaning foods. A fall off in growth is often associated with an increase in infections, especially after 9 months of age and typically lasts until two years. It is not uncommon for us to see children aged 18 months who have not gained weight for a year. This failure to thrive is invariably associated with recurrent infections - diarrhoeal disease, pneumonia, skin and ear infections are endemic. The problems of treating the infections are compounded by poor compliance with treatments offered and the children returning to the same environmental conditions from where the infections arose. This cycle is repeated until the child is over 2 years of age at which time the frequency of infections lessen and growth restarts, The amount of catch-up growth attained has not been well documented but our concerns about life long sequelae are heightened by the high rates we see of early death in young adults from cardio-respiratory disease and the later development of diabetes with its associated heart and renal disease.[14] Ecological studies from overseas have suggested a childhood link to adult morbidity and mortality and we may see another complete generation of children become chronically unwell adults with shortened life expectancies.[15,16]

Potential solutions

Non-Aboriginal health professionals have an important role in assisting Aboriginal people in finding solutions to problems in child health. It has to be acknowledged that the toll on indigenous health as a result of foreign settlement have not been fully appreciated. In addition, programs including those suggested in the National Aboriginal Health Strategy, endorsed by Commonwealth, State and Territory Governments, need to be revisited as they were never funded to allow implementation.[17]

In this part of Australia we support a multidisciplinary approach to the health problems of young Aboriginal children. We acknowledge that the issues of education, housing, employment and land rights have to be dealt with. Having acknowledged that, many of the children we look after live on their traditional lands, although with families having varying degrees of control over their own lives.

As health professionals we can offer assistance. We know the relationships between infection and malnutrition. We see the onset of infections and failure to thrive arise from 4-6 months of age. The Department of Maternal Child Health is coordinating a project to offer to selected communities an intervention at this point with a supervised weaning food program, run by local Aboriginal people but effectively supported with training, funds and logistics, to try to break this cycle. We propose to additionally support such a program by providing effective early medical intervention when infection arises. We propose to evaluate such a program to demonstrate the effectiveness from both the social and medical perspective. If it is effective and acceptable we hope to offer the program to other communities which wish to participate.

Health professionals from a previous generation recognise the same health problems in Aboriginal children in 1997 that they saw 25 years ago. The causes and ultimate solutions of this poor health go far beyond the boundaries of this paper and the answers lie in the social arena.[18]

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The 1996 national outbreak of *Salmonella mbandaka* - what happened in the NT?

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Introduction

In April 1996 an increase in *Salmonella mbandaka* gastroenteritis notifications was recognised in South Australia and Victoria and subsequently investigated by public health authorities. On June 23rd 1996 a country-wide recall of peanut butter products occurred following their implication in what was by then a national outbreak. *Salmonella seftenberg* had also been found in unopened jars of implicated peanut butter. This article outlines management of this outbreak in the NT by Darwin CDC.

Objectives of management

1. To identify and follow up notifications of *S.mbandaka* and *S.senftenberg* in the NT for the period of the outbreak.
2. To help complete the extent of the outbreak for the national picture.
3. To liaise with laboratories, the media, environmental health officers and clinicians to ensure an adequate public health response.
4. To prepare appropriate public health information for clinicians, the media and the general public.

Epidemiologic investigation

Notifications of salmonellae to Darwin CDC were reviewed for 1996, looking for cases of *S.mbandaka* or *S.senftenberg*. No notifications occurred until after the national recall. Sex, date of birth, place of residence, names of local and reference laboratories and contact details for general practitioners were obtained. Dates were collected from laboratory and medical records and general practitioner interviews for specimen collection, arrival at local laboratories, identification of *Salmonella*, arrival at reference laboratories, serotyping and notification. Cases were contacted where possible to obtain further food history and information on availability of foods for testing. An outbreak associated case was defined as a person with a faecal specimen positive for *S.mbandaka* or *S.senftenberg* collected between 24 Feb and 30 June 1996.

Liaison with laboratories and clinicians

The laboratory system for processing salmonella specimens was determined for the NT. Local laboratories were notified of the outbreak occurring interstate and encouraged to process specimens and send those positive for salmonella promptly to reference laboratories. Interstate reference laboratories were contacted regarding NT specimens not yet serotyped. A newsletter was prepared and sent to all NT clinicians to notify them of the national outbreak, to provide advice on symptomatology and to encourage appropriate collection of specimens.

Environmental investigation

Recall of implicated peanut butter brands was commenced by the Environmental Health Department as soon as information was available. A computerised database was used to recall products from all retailers. Environmental health officers helped interview cases and trace foodstuffs in remote areas. This occurred within 24 hours of notifications occurring. Suspect peanut butter jars were also collected and labelled. These were subsequently processed where *S.mbandaka* or *S.senftenberg* was isolated from a corresponding stool specimen from a case unless the food batch was already implicated.

Communication with the public

Radio interviews were conducted with the ABC in Alice Springs and Darwin advising the public about possible risks and of salmonellosis following peanut butter product consumption and the symptoms of salmonella infection. A media release for the NT News was written. All public enquires related to the outbreak through the Centre for Disease Control or Environmental Health were directed to an information line.

Results

Seven cases of *S.mbandaka* and one of *S.senftenberg* were notified between 25 June and 22 August 1996. Specimen collection dates of these notified cases were between 12 March and 19 June. The average time to notification was two months, with a maximum of 4 months. Due to these long delays foodstuffs were no longer available for testing and case recollection of exposure to peanut butter products was poor. The delays in notification were subsequently investigated in detail, and were found to be due to batching of isolates for transporting (up to 38 days) and waiting to be serotyped at interstate reference laboratories (up to 94 days).

Outcome

Laboratory staff locally and interstate were informed of the delayed notification of cases related to batching of isolates. Following this outbreak, the major public laboratory in the NT has combined isolates for transport with the major private laboratory, enabling more frequent transfer to reference laboratories. The time frame required for useful public health intervention

was relayed to serotyping laboratories. This resulted in a quicker turn around time at the end of the epidemic, but routine serotyping is still constrained by staffing and funding and individual reference laboratory priorities.

Discussion

This national outbreak of a food-borne disease highlights the need for a coordinated national system of surveillance which enables timely notification of cases. Effective surveillance cannot occur without a good relationship between laboratories, clinicians and public health authorities. Furthermore, it is highly dependent upon the very real economic constraints within laboratories today. Reduction in time taken for notification of salmonella serotypes may now occur as local laboratories join forces. Unfortunately, it is more difficult to address the area where the greatest delays occurred i.e. interstate reference laboratories which presently decide their own financial, staffing and specimen testing priorities. In the meantime, the Centre for Disease Control will endeavour to closely monitor for positive *Salmonella* specimens at the local laboratory level and encourage general practitioners and community health providers to be alert to possible clusters or outbreaks of foodborne disease.

Acknowledgments

This investigation was greatly assisted by the provision of results for Western Australia by the WA Pathology Centre's Enteric Laboratory staff, particularly Brian Mackenzie.

NT retrospective search for lyssavirus in humans

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In response to the recognition of a rabies-like lyssavirus in flying foxes, the Darwin CDC in collaboration with the National Centre for Epidemiology and Population Health initiated a retrospective review of hospital separations that may be attributable to undiagnosed bat lyssavirus infection.

Using the NT hospital morbidity database (Caresys), the first 3 of 9 diagnostic categories were searched from January 1994 to September 1996 for seven ICD 9 codes encompassing encephalitic illness (Table 1). The hospital records of these cases were reviewed to determine whether a cause for their encephalitis had been determined on the basis of serology, histopathology and culture.

Fifty-eight persons were discharged with one of these ICD 9 codes. Of these, 26 did not have a cause determined for their encephalitis. None of these 26 were tested for lyssavirus or for markers of classical rabies. Five cases died and two were autopsied. Brain tissue specimens from these cases were obtained from the forensic pathology department and tested at the Centers for Disease Control and Prevention. Both were negative for lyssavirus-specific inclusions via immunohistochemistry, immunofluorescence and reverse-transcriptase polymerase chain reaction (PCR). There were no pathology specimens remaining in storage for testing for any of the 21 survivors.

There is a high proportion of unexplained illness among cases of encephalitis in the NT. With the advent of the first human case of bat lyssavirus occurring in Australia, it is appropriate to be testing for this disease in patients with encephalitic symptoms. Because only two of five fatal cases of illness due to unexplained encephalitis were autopsied and neither of these cases were tested for rabies-like lyssavirus, rabies-like illness could go undiagnosed in the Northern Territory. This investigation is currently being extended back to 1992 for all 9 diagnostic categories and with the inclusion of ICD-9 code 047 (unspecified viral meningitis).

Table 1

ICD 9 code	Descriptor
323	encephalitis, myelitis, encephalomyelitis
048	other enterovirus diseases of the central nervous system
049	other non-arthropod-borne viral diseases of the central nervous system
054.3	herpetic meningo-encephalitis
062	mosquito-borne viral encephalitis
063	tick-borne encephalitis
064	other and unspecified viral encephalitis transmitted by arthropods

Acknowledgments:

We would like to thank Dr Charles Rupprecht and the Viral and Rickettsial Zoonoses Branch, National Center for Infectious Diseases, Center for Disease Control and Prevention, Atlanta, USA for advice and laboratory testing. Many thanks also to Dr John Condon from the Epidemiology Department of Territory Health Services, the Forensic Pathology department at Royal Darwin Hospital, the staff of the Northern Territory CDCs and the Medical Record Department of Royal Darwin Hospital for their valuable assistance in conducting this study.

A cluster of invasive *Staphylococcus aureus* disease in the Top End

Sue Skull, CDC, Darwin and NCEPH, MAE Program, ANU, Canberra.

Staphylococcus aureus remains a serious cause of morbidity and mortality. Bacteraemia is the most serious result of infection and can cause endocarditis, overwhelming sepsis and death.[1] Mortality remains around 30% with 10-40% having no identifiable focus for bacteraemia.

In February this year, paediatricians at Royal Darwin Hospital noted that 5 children had been admitted with invasive disease due to *S. aureus* disease in the previous 4 months where non could be recalled for many years previously. Adult physicians could also anecdotally confirm a recent increase in cases of invasive staphylococcal disease. Review of hospital microbiology records for invasive isolates showed that from November 1996 to March 1997 there had been 55 isolates of invasive *S. aureus* compared with 22, 18, 31 and 25 isolated in the 4 previous four month periods.

Identification of true outbreaks is sometimes difficult because the incidence of endemic *S. aureus* infection is high. Clues to the presence of an outbreak come from temporal and geographic data showing a high frequency of occurrences of *S. aureus* infection or occurrences in patients who rarely become infected (eg arthroscopy). Investigations are often hampered by the inability to rapidly distinguish strains. Phagetyping or molecular techniques in reference laboratories can be helpful. Outbreaks, however, are most often caused by multiple phagetypes, indicating that breakdown in techniques are mostly responsible rather than shedding from a single carrier.

An investigation of this apparent cluster in the NT is underway which will examine all sterile site isolates of *S. aureus* other than those sensitive to penicillin or MRSA isolates from June 1996 to April 1997. Resistance patterns, phage types and virulence factors for implicated isolates will be determined by the WA Pathology Centre. Hypotheses for possible sources for the cluster will be generated by considering the characteristics of the epidemic curve and examining hospital case records for common epidemiological links. The burden to the community of the apparent cluster will be examined in terms of hospital admission and length of stay, use of antibiotics and outcome including disability or death.

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The Chronic Diseases Network

Steve Morton, CDC, Darwin

Seventy health professionals, health administrators and consumer representatives from government and non-government organisations around the Northern Territory met in Darwin in March to 'kick-start' a Chronic Diseases Network.

There was great interaction between government and non-government organisations and thirty one separate interest groups were identified including disease specific groups (eg diabetes and renal disease), professional groupings and groups interested in particular themes (eg social and cultural issues).

Participants felt the network should support them in reaching their work goals by focussing on Aboriginal health, addressing best practice approaches, developing a collective memory and fostering collaboration.

Main priorities for the network to address were seen to be communication, professional support and co-ordination of services/prevention.

The aims of the network are:

To promote:

- communication,
- co-ordination,
- collaboration; and
- collective memory

in the area of continuity of care for the common chronic diseases affecting the NT population.

These aims will be achieved through participation by clients, carers, families, Aboriginal Health Workers, other health professionals and non-government organisations, and, through individual and collective advocacy.

Good progress has been made since the workshop and activity is building. Already, there are more than one hundred and thirty names on the network database. Communication links are opening up and information is beginning to flow. The first edition of the network bulletin, "*The Chronicle*" was well received.

A steering committee has formed and will meet in the near future. If you wish to know more about the Chronic Diseases Network, or receive "*The Chronicle*" contact Steve Morton on 8922 8280.

NT NOTIFICATIONS OF DISEASES BY DISTRICTS
1 JANUARY TO 31 MARCH 1997 and 1996

DISEASES	ALICE SPRINGS		BARKLY		DARWIN		EAST ARNHEM		KATHERINE		TOTAL	
	'97	'96	'97	'96	'97	'96	'97	'96	'97	'96	'97	'96
Acute Rheumatic Fever	2	0	0	0	2	5	0	1	0	1	4	7
Adverse Vaccine React.	2	0	0	0	3	0	0	0	0	0	5	0
Arbovirus infections												
Barmah Forest Virus	0	0	1	0	7	8	4	1	2	0	14	9
Kunjin Virus	0	0	0	0	1	1	0	0	0	0	1	1
Dengue	0	0	0	0	4	3	2	0	0	0	6	3
Ross River Virus	15	1	13	0	50	30	3	15	19	19	100	65
Campylobacter	23	26	0	0	31	54	2	0	10	20	66	100
Chlamydia	42	56	9	0	52	33	13	17	10	30	126	136
Congenital Syphilis	0	0	0	0	2	0	0	0	0	0	2	0
Donovanosis	1	0	0	0	3	2	0	0	0	3	4	5
Glomerulonephritis	0	0	0	0	1	0	0	2	0	0	1	2
Gonococcal Disease	71	90	8	0	91	13	13	14	32	47	215	164
Haemophilus Inf type b	1	1	0	0	0	2	0	0	0	0	1	3
Hepatitis A	7	1	1	0	5	1	0	1	6	6	19	9
Hepatitis B	0	0	0	0	3	0	1	0	0	0	4	0
Hepatitis C (incidence)	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis C (prevalence)	11	5	1	0	78	23	1	0	0	0	91	28
HIV infections	1	1	0	0	3	0	0	0	1	0	5	1
HTLV-1	1	6	0	0	1	1	0	0	0	1	2	8
Legionnaires Disease	0	0	0	0	0	0	1	0	0	0	1	0
Leprosy	0	0	0	0	0	1	0	0	0	1	0	2
Malaria	0	0	0	0	8	6	1	0	1	0	10	6
Measles	2	0	0	0	3	2	0	0	3	0	8	2
Meningococcal Infection	1	0	0	0	0	1	0	0	0	0	1	1
Mumps	2	0	0	0	1	1	0	0	0	0	3	1
Pertussis	0	3	0	0	6	1	1	0	1	0	8	4
Pneumococcal Disease	3	10	0	0	9	3	0	0	1	3	13	16
Rotavirus	4	36	0	0	4	5	0	0	1	1	9	42
Rubella	1	0	1	0	1	5	0	0		0	3	5
Salmonella	22	49	2	0	60	67	2	11	8	24	94	151
Shigella	35	13	0	0	20	14	2	7	6	3	63	37
Syphilis	23	27	3	0	14	16	10	6	7	9	57	58
Tuberculosis	0	3	0	0	2	5	0	1	0	1	2	10
Typhoid	0	0	0	0	1	0	0	0	0	0	1	0
Typhus	0	0	0	0	1	0	0	0	0	0	1	0
Total	**270**	**328**	**39**	**0**	**467**	**304**	**56**	**76**	**108**	**169**	**940**	**877**

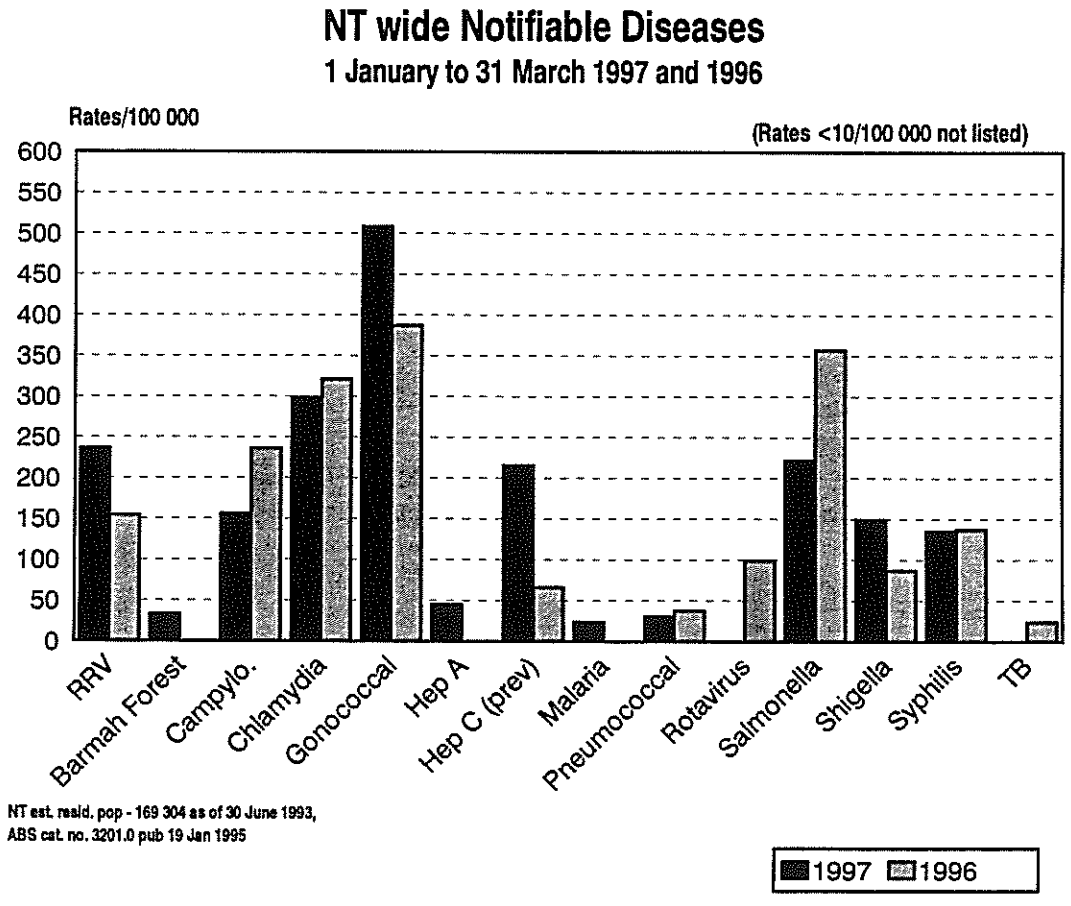
Points to note regarding notifications:

- Australian Encephalitis (MVE), Amoebiasis, Botulism, Brucellosis, Chancroid, Cholera, Congenital Rubella Syndrome, Diphtheria, Gastroenteritis, Gonococcal conjunctivitis, Hepatitis D and E, Hydatid Disease, Leptospirosis, Listeriosis, Lymphogranuloma venereum, Poliomyelitis, Yersiniosis, and Viral Haemorrhagic Fever are all notifiable but had "0" notifications in this period.
- Tennant Creek did not forward any notifications for this period in 1996.
- The overall trend on the notifications of prevalent cases of hepatitis C has been a gradual reduction over the last few years. The increased number of notifications in the first quarter of this year is thought to reflect changes in health services testing practices rather than the overall prevalence in the community.
- The increase in Shigella notifications in 1997 reflects an increase in notifications mainly in Alice Springs without a change in surveillance.
- Tuberculosis cases for this period in 1996 include 4 from a localised outbreak in Alice Springs.

Notified cases of Vaccine Preventable Diseases in NT by Report Date 1 January to 31 March 1997 and 1996

DISEASES	TOTAL		No. cases among children aged 0-5 years	
	'97	'96	'97	'96
Congenital rubella syndrome	0	0	0	0
Diphtheria	0	0	0	0
Haemophilus influenzae type b	1	3	1	2
Hepatitis B	4	0	1	0
Measles	8	2	4	1
Mumps	3	1	1	0
Pertussis	8	4	2	0
Poliomyelitis, paralytic	0	0	0	0
Rubella	3	5	0	3
Tetanus	0	0	0	0

- Mumps is largely under-reported.



MALARIA NOTIFICATIONS, NORTHERN TERRITORY
January to March 1997

Compiled by Peter Knibbs, CDC, Darwin

Nineteen notifications of malaria were received for the first quarter of 1997. 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	Family visit	*P.falciparum*	Yes	Chloroquine taken despite not recommended for PNG.
PNG	Family visit	*P.falciparum*	Yes	As above plus incomplete course of prophylaxis taken.
PNG	Working	*P.vivax*	Yes	Second relapse. Did not take primaquine after initial infection, but took course after first relapse.
PNG	Holiday	*P.vivax*	Yes	Missed many doses of doxycycline.
PNG	Holiday	*P.vivax*	Yes	Relapse in above patient despite full course of primaquine.
PNG	Family visit	*P.vivax*	Yes	Incorrect prophylaxis (chloroquine) and poor compliance.
PNG	Family visit	*P.vivax*	Yes	Malaria developed 10 weeks after return from PNG.
PNG	Family visit	*P.vivax*	Yes	Father of above patient with same delay until symptoms developed.
ASIA/SE ASIA				
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman detained in Australian waters.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman detained in Australian waters.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman detained in Australian waters.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman detained in Australian waters.
Indonesia	Holiday	*P.vivax*	No	Diagnosed in Nhulunbuy.
Indonesia	Indonesian resident	*P.vivax*	No	Indonesian resident detained in Australian waters.
Thailand	Holiday	*P.falciparum*	No	Aware of risk of malaria but chose not to take prophylaxis.
Indonesia	Holiday	*P.vivax*	Yes	Took a sub-therapeutic dose of doxycycline.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman detained in Australian waters.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman, detected on screening.
Indonesia	Indonesian resident	*P.falciparum*	No	Indonesian fisherman, detected on screening.

*The high number of cases for the first quarter have been inflated by the eight cases found in Indonesian fishermen in Australian waters. A positive sign is the absence of cases in PNG secondary students returning after the Christmas holidays. Four cases were diagnosed outside Darwin with three from Nhulunbuy and one from Katherine. Two of the cases diagnosed at Nhulunbuy were residents of Groote Eylandt and this reinforces the need for prompt notification of cases so that the appropriate measures can be taken to prevent malaria becoming endemic in the NT.

PROFILES AND STAFF UPDATES

NEW STAFF

DARWIN
Merv Fairley
Public Health Nurse, TB/Leprosy

Merv recently filled the Public Health Nurse, TB/leprosy position in Disease Control after spending the last two and a half years running the Detoxification Unit in Coconut Grove.

TENNANT CREEK
Fiona Maslin
AIDS/STD Educator

After 5 months maternity leave, Fiona has joined forces with Marianne Pascoe in Disease Control, as the new AIDS/STD Educator. Originally from Ireland, Fiona has been living in Tennant Creek for the last three years, working as a midwife at the hospital.

TEMPORARY TRANSFERS

ALICE SPRINGS
Virginia Sitzler
Public Health Nurse

Virginia has transferred from Community Health into Jenny Rossiter's position for 12 months as Public Health Nurse. Her area of responsibility is mainly immunisation and surveillance and outbreak control.

NHULUNBUY
Cathy Roberts
Unit Coordinator

Gill Campbell, Unit Coordinator, has recently taken up a 6 month opportunity of working for the Aboriginal Resource and Development Service in Nhulunbuy. Cathy Roberts (Public Health Nurse, Nhulunbuy) has transferred into Gill's position as Unit Coordinator for the 6 months.

DEPARTURES

KATHERINE
Belinda Farmer
Public Health Nurse, AIDS/STD

Belinda and family have recently moved back to Alice Springs, following her husband's promotion in the Police Force. Margaret Carnegie-Smith from Air Medical Services in Katherine is currently acting in Belinda's position until it is permanently filled.