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NORTHERN TERRITORY

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Cervical cancer vaccination - Human Papillomavirus Vaccination Program launched

Chris Nagy and Julie Graham, CDC Darwin

The National Program

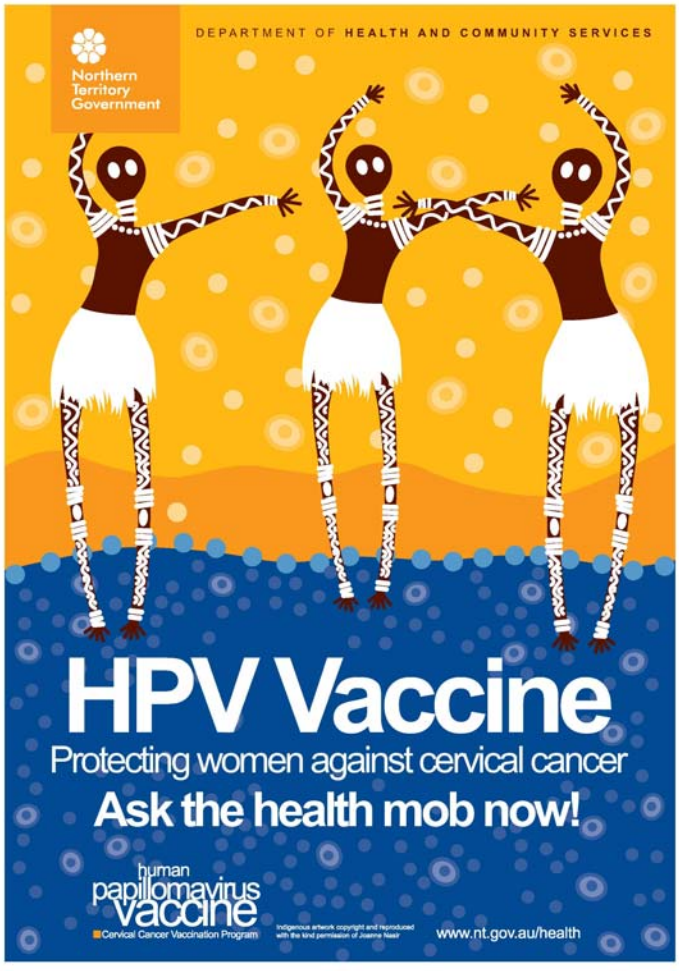
In November 2006 the Prime Minister announced that the Australian Government would fund the 3 dose course of human papillomavirus vaccine (HPV) to be given over a 6 month period for the following groups of Australian young women:

- An ongoing cohort of 12-13 year old females as part of a school based program.
- A catch up program over 2 years for 13-18 year old females mainly through a school based program.
- A further 2 year catch up program for all females up to the age of 26 years through a community based program, delivered through GP's and other community vaccine providers commencing in mid 2007.

The Northern Territory (NT) 2007 Program

Each State and Territory has planned a cohort specific program that commences Australia-wide on April 1 2007. In the NT the program of free vaccine will commence as follows:

- In urban NT -
  All girls in Year 10, 11 and 12 will be offered the 3 doses of HPV vaccine in the current 2007 school year.
- In rural and remote NT -
  All girls between 10-18 years (DOB 1/1/89-31/12/96) will be offered HPV vaccine either opportunistically or through a school or community based program. This recognises the higher disease prevalence and varied school attendance.



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Northern Territory Government
Department of Health and Community Services

- From July 1 2007 -

  All women 18 to 26 years of age wishing to be vaccinated for HPV will be encouraged to attend a GP for service delivery.

In urban areas the vaccine will be administered utilising an approved accelerated schedule of 0, 1 and 4 months in 2007 so that all doses can be administered within the current school year. Consent forms and information pamphlets have been issued to all eligible students throughout the NT. The urban school-based program commences at the start of Term 2 (week of 2 April).

In rural and remote NT, vaccine doses may be administered in conjunction with a community day, school screening or special program or opportunistically at their clinic. An Indigenous specific pamphlet and consent form has been designed in consultation with health workers and Indigenous women. Use of the consent form is optional in communities. Many communities rely on verbal parent/guardian consent for vaccination and this remains an acceptable practice.

Contents

What is HPV?

HPV is a very common and usually asymptomatic infection that affects most people (4 out of 5) at some stage.[1] There are over 100 different types of HPV, including some that affect the genital area. It is generally acquired within a few years of onset of sexual activity. In most people infection clears up naturally in about 12-24 months, however in 3-10% of women HPV stays in the cells of the cervix and may lead to cervical cancer.[1] Routine testing for cervical presence of HPV is not recommended. There is no cure for HPV but a vaccine can now be given to protect women from acquiring 2 common types of the virus that are known to cause 70% of cervical cancer and 90% of genital warts.[2]

What is cervical cancer?

Cervical cancer is the second most common cancer affecting women throughout the world. It is less common in Australia because of the success of Pap smear screening programs (National Cervical Screening Program) however approximately 200 women still die from the disease each year.[3] It usually takes up to 10 years to develop cervical cancer and HPV is the underlying cause in almost all cases. Having regular Pap smears is the best way to ensure that any cervical cell changes are monitored and treated (if needed) well before cancer develops.

What about the HPV vaccine?

The HPV vaccine, Gardasil®, used in the national program, is a safe and effective vaccine. It protects women against the 4 most common types of HPV that are known to cause either cervical cancer (types 16 and 18) or genital warts (types 6 and 11). Seroconversion occurs in 99.5% of those women who complete the course of 3 vaccines.[3] The vaccine does not protect from other types of HPV infection and does not protect people already infected with HPV. The vaccine is given as a course of 3 injections into the upper arm over a period of 6 months. Side effects of the vaccine are mild and include redness and swelling of the arm for 1 to 2 days and occasional fever. Severe allergic reactions

are rare. Clinical trials are continuing to determine if booster doses are required. The vaccine is licensed for use in males between the ages of 9 and 15 years of age and for girls from 9 years of age but these groups are not funded as part of the national program at this time.

For further information about the national and NT program and available education resources contact the HPV Coordinator at CDC Darwin on 89226738 or online at www.health.gov.au/cervicalcancer.

References

1. NCIRS factsheet, Human Papillomavirus Vaccines for Australians: Information for GPs and immunisation providers. Available from: URL: http://www.ncirs.usyd.edu.au/facts/hpv_jan_2007.pdf, accessed 20/03/2007.
2. Australian Government, The National HPV Vaccination Program, Protecting your daughter from cervical cancer.
   Available from: URL: http://www.health.gov.au/internet/standby/publishing.nsf/Content/AE24190792ACE5B1CA2572990016D0EF/$File/parents_brochure.pdf, accessed 3/04/07.
3. Australian Government, Immunisation Provider Guidelines, Cervical Cancer Vaccination. National HPV Vaccination Program. Available from: URL: www.health.gov.au/internet/standby/publishing.nsf/Content/general-practitioners, accessed 3/4/07.

Introducing Rotavirus Vaccine in the Northern Territory (NT)

Chris Nagy, Charles Roberts, Heather Cook, and Vicki Krause, CDC Darwin

Background

Following a national decision not to fund rotavirus vaccine, the NT Government stepped up to provide the vaccination for all NT infants from October 1 2006. The decision recognised the impact recurrent epidemics (Figure 1), high rates of rotavirus disease and subsequent hospitalisations have on NT individuals, families, health providers and facilities. This information was available in part because rotavirus has been a notifiable disease in the NT since 1994. With local systems able to support and record a new vaccine and a good working relationship with vaccine providers, the program was introduced quickly. Following a 6 week

Figure 1 . Rotavirus notifications in the Northern Territory by month and region 2000-2006

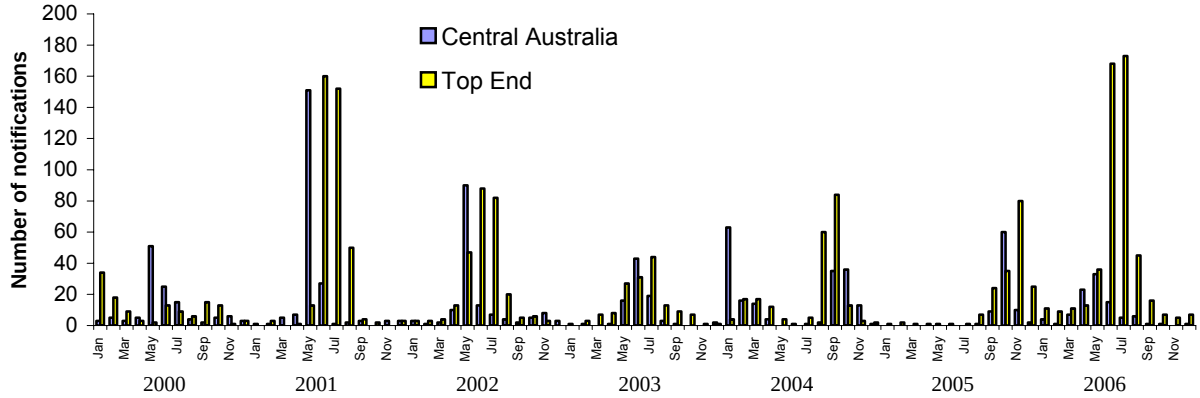


Figure 2. Rotarix preparation and administration guide

DEPARTMENT OF HEALTH AND COMMUNITY SERVICES

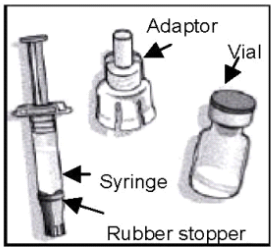
How to prepare Rotarix® for use

Rotarix® comes as a powder and a separate fluid that need to be mixed together before giving to the baby to drink.

MUST BE GIVEN ORALLY – DO NOT INJECT

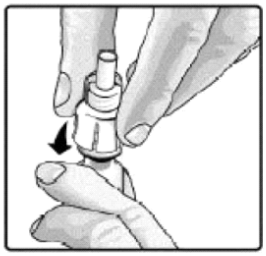
Step 1

Take the three items out of the box



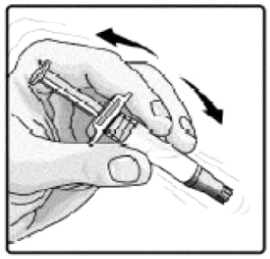
Step 2- Adapter & Vial

Take the lid off the vial and push the adapter firmly onto the vial



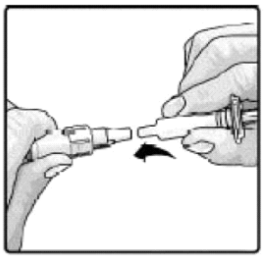
Step 3- Syringe

Shake well – the fluid will turn white



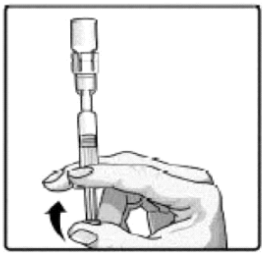
Step 4- Syringe & Adapter

Take the rubber stopper off the syringe. Push it firmly onto the adapter



Step 5 –Syringe & Vial

Inject the fluid from the syringe into the vial

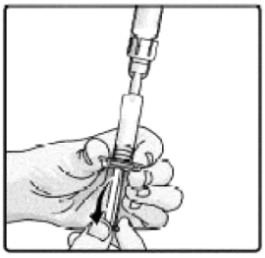


Step 6 - Syringe & Vial

Shake well to make sure the powder is dissolved.

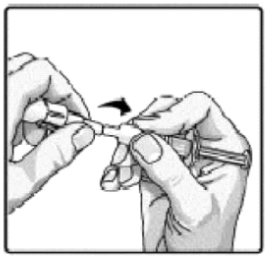
Step 7 – Syringe & Vial

Withdraw all the fluid back into the syringe- it looks milky white.



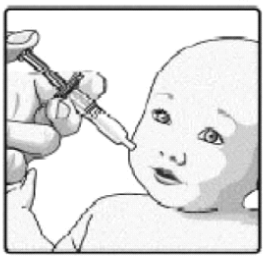
Step 8- Syringe

Pull the syringe off the adapter



Step 9-Syringe (no needle)

Administer all the vaccine into the baby's mouth (on the inside of the cheeks).



GlaxoSmithKline

Northern Territory Government
Department of Health and Community Services

planning phase, all infants born on or after 1 August 2006 have been offered oral Rotarix® vaccine.

Methods

Direction from appropriate health professionals within the NT was sought to determine which of the two available vaccines to use to achieve vaccine delivery outcomes in relation to timeliness, dosage and administration and local disease epidemiology. Identifying a target group for vaccine administration was determined by cost, social equity and local disease epidemiology. Utilising current systems to collect data and generate recall reminder lists locally enables us to analyse this program early. Development and delivery of culturally appropriate education materials was prioritised given the frequency of vaccine schedule changes and the distance between immunisation providers in the NT. Educating all vaccine providers throughout the NT was prioritised eg; Aboriginal Health Workers (AHWs), Nurses, GPs. Resources specific to the program, such as the pictorial reconstitution guide (Figure 2) and dose cut off table (Figure 3), were developed to prevent vaccination errors in administration and timeliness. A DVD highlighting the preparation and administration of this oral vaccine was made with local AHWs.

In addition the following measures were employed:

- NT surveillance of rotavirus disease was enhanced to include details on rotavirus vaccination, hospitalisation and serotyping.

Figure 3. Oral Rotarix® vaccine dose cut off dates

Oral Rotarix® vaccine—Dose cut-off dates

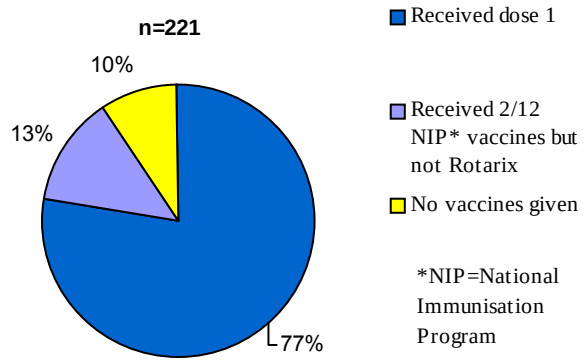
Children born in August

	DOSE 1	DOSE 2
If born on	**Do not give dose 1 after**	**Do not give dose 2 after**
1-Aug	7-Nov	16-Jan
2-Aug	8-Nov	17-Jan
3-Aug	9-Nov	18-Jan
4-Aug	10-Nov	19-Jan
5-Aug	11-Nov	20-Jan
6-Aug	12-Nov	21-Jan
7-Aug	13-Nov	22-Jan
8-Aug	14-Nov	23-Jan
9-Aug	15-Nov	24-Jan
10-Aug	16-Nov	25-Jan
11-Aug	17-Nov	26-Jan
12-Aug	18-Nov	27-Jan
13-Aug	19-Nov	28-Jan
14-Aug	20-Nov	29-Jan
15-Aug	21-Nov	30-Jan
16-Aug	22-Nov	31-Jan

Children born in August

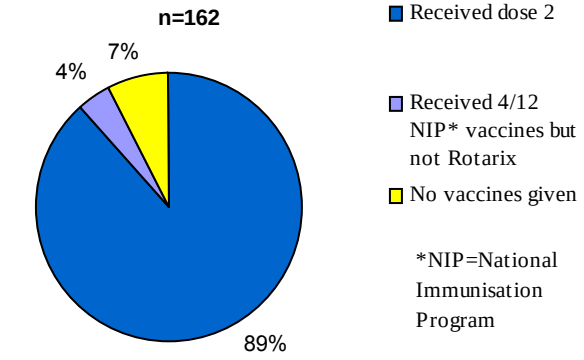
	DOSE 1	DOSE 2
If born on	**Do not give dose 1 after**	**Do not give dose 2 after**
17-Aug	23-Nov	1-Feb
18-Aug	24-Nov	2-Feb
19-Aug	25-Nov	3-Feb
20-Aug	26-Nov	4-Feb
21-Aug	27-Nov	5-Feb
22-Aug	28-Nov	6-Feb
23-Aug	29-Nov	7-Feb
24-Aug	30-Nov	8-Feb
25-Aug	1-Dec	9-Feb
26-Aug	2-Dec	10-Feb
27-Aug	3-Dec	11-Feb
28-Aug	4-Dec	12-Feb
29-Aug	5-Dec	13-Feb
30-Aug	6-Dec	14-Feb
31-Aug	7-Dec	15-Feb

Figure 4. Dose 1 Rotarix® coverage



Source : NT Childhood Immunisation Database

Figure 5. Dose 2 Rotarix® coverage



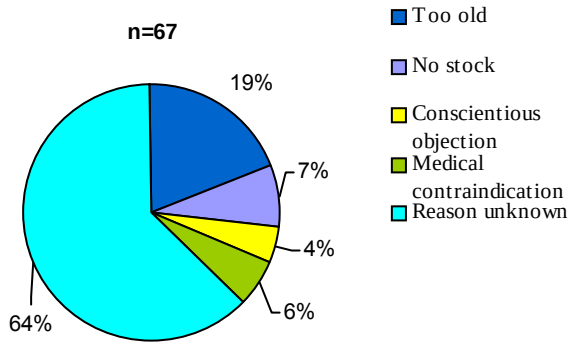
Source : NT Childhood Immunisation Database

- Surveillance of intussusception continued.
- Surveillance for adverse events, vaccine leakage and errors in administration of the new vaccine were heightened.
- Assessment of coverage and timeliness was calculated for all children born in August 2006 who were residing in the NT when the 2 and 4 month vaccines were due.

Results

- Providers and parents both show acceptance and understanding of the program.
- Preliminary data shows 78% of eligible infants received dose 1, with 89% of those infants receiving dose 2 (Figures 4 and 5).
- 67 eligible infants did not receive Rotarix® vaccine. Figure 6 shows reasons for not receiving vaccine.
- No cases of intussusception or rotavirus have been recorded in vaccinated infants.
- No adverse events following immunisation have been reported.
- Only 2 vaccine administration errors have been recorded since the program start.
- Monitoring of vaccine administration errors is ongoing with a decrease noted in the number of vaccines administered outside the age range.

Figure 6. Reasons for not vaccinating?



Source : NT Childhood Immunisation Database

Conclusions

The NT remains the only jurisdiction in Australia to offer rotavirus vaccine as part of its' routine immunisation schedule. Acknowledgment and timely response to provider and client feedback about the introduction of this program has enabled early intervention and identification of minor program issues. Oral rotavirus vaccine is widely accepted and safely administered throughout the NT.

Acknowledgements

Special thanks to Christine Selvey, Rosalie Schultz and GlaxoSmithKline Australia.

Rotavirus vaccine is an Oral Vaccine

Rotavirus immunisation audit in a remote community

Phillipa Pryor, Chris Nagy, Charles Roberts, CDC Darwin

Introduction

Rotavirus is the leading cause of gastroenteritis in infants and young children. Transmitted via the faecal-oral route, these viruses account for an estimated 600 000 deaths worldwide and 2 million hospitalisations, 80% within the developing world. In Australia, rotavirus infections account for half of all children under 5 years admitted for acute gastroenteritis, and in Indigenous Australians, the focus of this audit, children are hospitalised 3-5 times more often than their non-Indigenous peers with severe rotavirus gastroenteritis.[1,2]

In response to this significant burden of disease, several rotavirus vaccines have been developed and 2 live-attenuated oral vaccines were released in Australia in 2006, RotaTeq® (3 dose reassortant vaccine containing 5 serotypes) and Rotarix® (2 dose attenuated human virus of single serotype).

The NT is the first jurisdiction in Australia to have funded the administration of a rotavirus vaccine, and the Rotarix® 2 dose vaccine was introduced on 1 October 2006 for all children born on or after 1 August 2006.[2]

The National Centre for Immunisation Research and Surveillance (NCIRS) recommends that Rotarix® should be administered together with the other scheduled vaccinations at 2 and 4 months. The first dose should be administered no later than 14 weeks of age, and the second dose no later than 24 weeks of age. The interval between doses should be no less than 4 weeks. [1]

The reason for these strict limitations on the timing of administration stems from concerns that arose following the original rotavirus vaccine RotaShield® developed in the US in 1998-1999. The administration of this vaccine had a suggested association with increased rates of intussusception, in particular in those children whose first dose was given after the age of 3 months. The vaccine was subsequently withdrawn and new clinical trials of Rotarix® therefore limited the administration of the first dose to children under 3 months and the second dose to those under 6 months. It was also required to demonstrate no increase in intussusception rates in those children receiving the vaccine.[1,2] The safety of administration of this vaccine in older children therefore has not been studied, and this coupled with the fact that the main burden of disease is in children less than 3 years old has led to the age of administration being limited and catch-up immunisation in older children not being recommended.

Other potential side effects of Rotarix® include a 1-5% chance of diarrhoea, vomiting, loss of appetite, flatulence and irritability in the week post-administration.[2]

Both Rotarix® and RotaTeq® are close to 70% effective against any rotavirus gastroenteritis, and 85-100% effective in preventing severe gastroenteritis.[1,2]

Aims of the audit

Rotarix® is the only vaccine on the NT immunisation schedule that has a strict maximum age restriction for administration and no catch-up regimen. It is therefore important to ensure health care providers are administering this new vaccine within the recommended guidelines to gain maximum coverage and effectiveness.

This audit aimed therefore to assess:

- The coverage of eligible children in a remote Top End Health Clinic
- The timeliness of administration:
  - dose 1 before 14 weeks together with 2 month vaccinations
  - dose 2 before 24 weeks together with 4 month regimen
  - more than 4 week interval between doses
- Coverage of other scheduled vaccinations

Results

The cohort

Identifying the cohort was difficult. Although the NTCID (Northern Territory Childhood Immunisation Database) cited 24 children as possible candidates for the audit:

- 5 children were too young to have yet received the vaccine
- 1 was already too old when the vaccine was introduced
- 5 children were listed by the NTCID as 'baby of' their mother's name, and although there was a record of their birth in the clinic birth registry, no charts existed for these children and they were also not included in the clinic Medicare registry
- 1 child was recorded with the wrong birth date on the NTCID list and so was not eligible for this audit.

Therefore a total cohort of 12 children were used in this audit.

- 67% of eligible children received Rotarix® dose 1. Of these, 100% were given before the age limit of 14 weeks.

Table 1. Details of vaccine delivery

	Age at administration (Weeks)		
	Dose 1	Dose 2	Dose interval (weeks)
1	8.14		
2	10.14		
3	8.14		
4	8.14		
5			
6	7.71	15.71	8.00
7			
8			
9			
10	9.14		
11	8.71		
12	14.00	24.00	10.00
Average age	9.26	19.86	
Coverage	67%	100%	

- 2 of the original cohort of 12 were eligible for Rotarix® dose 2, both of which were administered before the upper age limit of 24 weeks.
- The average age for receiving the Rotarix® dose 1 was 9.3 weeks of age, well under the recommended upper limit of 14 weeks.
- The average age for dose 2 was 19.9 weeks, also well under the upper limit of 24 weeks. The minimum interval between doses of 4 weeks was observed in all cases.
- Of the 4 infants that did not receive Rotarix®, 3 did not receive any of their scheduled immunisations and 1 received scheduled vaccines but not Rotarix® (reason for this unknown).
- All doses of Rotarix® were given concurrently with the other scheduled vaccines.
- 3 infants had not received any scheduled vaccines at 2 and 4 months according to the NTCID.

Assessment

Although the number of children eligible was small, this audit has shown that the rotavirus vaccine Rotarix® has fitted in well with the usual vaccination schedule. Of those vaccines administered, 100% were given at the recommended age of 2 months and 4 months, and there were no vaccine errors. Three of the 4 children who did not receive the first dose of Rotarix® also had no history of receiving any other vaccinations. This demonstrates that despite the time limitations of this new vaccine, healthcare providers at the clinic were able to easily manage this new addition to the already well administered childhood immunisation schedule.

References

1. NCIRS, Rotavirus vaccines for Australian children: Information for GPs and immunisation providers. *http://www.ncirs.usyd.edu.au/facts/rotavirus_vaccine_for_children_sep_2006.pdf* accessed 02/02/2006.
2. Nagy C, Selvey C. Rotavirus Vaccine introduced in the NT, *The Northern Territory Disease Control Bulletin* Vol 13, No.3, September 2006.

Health Clinic A Immunisation Audit

Sid Vemuri, Chris Nagy, CDC Darwin

Aims

The primary objectives of this audit were to:

- Confirm the immunisation status of children born after 01 January 2005 who primarily receive health care at Health Clinic A.
- Verify the accuracy of data of Health Clinic A's paper-files and Primary Care Information System (PCIS), and the Northern Territory Department of Health and Community Services' Community Care Information System (CCIS).

The secondary objective of this audit was to:

- Assess the timeliness of administration of the rotavirus vaccination.

Background information

Since 01 January 2005, there have been 2 changes to the NT childhood vaccination schedules. The first came into effect from 01 November 2005 and reflected the introduction of the inactivated poliomyelitis vaccine (IPV) in conjunction with other diphtheria, tetanus and pertussis (DTP) containing vaccines, hepatitis A vaccine for Indigenous children at 12 and 18 months and varicella vaccine for all infants at 18 months. The second became effective from 01 October 2006, though considered children born from 01 August 2006, and involved the introduction of universal rotavirus vaccine for all infants at 2 and 4 months. As a result of such changes, there was concern regarding the immunisation status of children younger than 2 years of age.

In August 2006, Health Clinic A decided to replace paper-based files with a complete computer-based system, the Primary Care Information System (PCIS), to record patient information. There was concern that in the process of transposing past information on PCIS, potentially incorrect information may be recorded. Additional concern related to inaccuracies resulting from user input into PCIS.

Method

Two reports were generated from PCIS:

- a list of patients born after 01 January 2005 that had presented to the clinic and
- a list of immunisations provided to patients, younger than 15 years of age, after 01 January 2005.

From these 2 reports, a list of 26 children born after 01 January 2005 that had presented to the clinic and should have received their immunisations was created.

Data on these 26 children were then checked against a list, created by the Department of Health and Community Services' (DHCS) Community Care Information System (CCIS), of the children born after 01 January 2005 who have listed Health Clinic A as their usual health

Table 1. Data lists created from paper-based files, PCIS and CCIS

Number of children from Health Clinic A listed through PCIS and paper-based files		*26*
Number of children listed through PCIS and confirmed using CCIS at Health Clinic A	15	
Number of children listed in PCIS who have alternative health care providers as listed in CCIS	10	
Number of children confirmed at Health Clinic A listed in PCIS but not in CCIS	1	
Number of children from Health Clinic A listed through CCIS		*23*
Number of children not listed in PCIS but listed in CCIS with Health Clinic A as their usual service provider	8	
Number of children incorrectly listed in CCIS with Health Clinic A as their health care provider	5	
Number of children not listed in PCIS but have correctly listed Health Clinic A as their usual health care provider	3	

Table 2. Demographics and Immunisation status

Total number of children		**19**
Number of children born between 01 January 2005 and 31 October 2005	9	
Number of children born between 01 November 2005 and 31 July 2006	8	
Number of children born on or after 01 August 2006	2	
Number of children with an up-to-date immunisation status		3 (16%)
Number of children with an up-to-date immunisation status involving the Rotavirus vaccination	0	
Number of children with successful catch-up regimen	3	
Number of children with an incomplete immunisation status		16 (84%)
Number of children with a poor immunisation status, as indicated by more than 1 scheduled vaccination time interval missed	8	

care provider. In this process, discrepancy for 17 children was found. Of these 17 children, 9 were listed in PCIS but did not usually receive their immunisations at Health Clinic A as indicated in CCIS. The remaining 8 children were listed in CCIS and when checked against PCIS, 3 were confirmed as being regular clients of Health Clinic A. Upon further investigation, the residual 5 children listed in CCIS but not in PCIS were found to access health care outside Health Clinic A. The data lists are summarised in Table 1.

Through this process, 19 children born after 01 January 2005 were confirmed to have Health Clinic A as their usual health care and immunisation provider. The immunisation history of each of these 19 children was accessed, evaluated using the relevant vaccination schedules for each child (dependant on their date of birth) and compared using paper files, PCIS and CCIS.

Results

Table 2 shows the results of the audit.

Discussion

A considerable proportion (84%) of children born after 01 January 2005 have an incomplete immunisation status. Of these children, 50% are poorly immunised (more than 1 scheduled vaccination time interval missed). In many of the paper-files of these children, a catch-up regimen has been created but appears to have failed due to follow-up. The remaining 8 children have only missed 1 vaccine although they have received other vaccinations in that time interval and in some instances, subsequent time intervals.

The rotavirus vaccine was not administered correctly in either of the 2 children who had appropriate eligibility (i.e. born after 01 August 2006). It is recommended that the rotavirus vaccine be administered with the 2 and 4 month scheduled vaccines, with the first dose administered no later than 14 weeks of age and the second dose no later than 24 weeks of age, with no less than 4 weeks elapsing between the doses.[1] In this audit, it was found that 1 child received the rotavirus vaccine correctly at 2 months (9 weeks of age) but failed to receive the second dose at 4 months with the other scheduled vaccines. This child is now 21 weeks old. The second eligible child failed to receive the initial dose with the scheduled 2-month vaccinations and is now 13.85 weeks old. These 2 children are still eligible to receive their respective doses and Health Clinic A has been informed to initiate immediate follow-up.

In regards to the accuracy of data, there appears to be limitations in both PCIS and CCIS. In respect to PCIS, it is important to acknowledge that staff need to be appropriately trained and confident in using this system. Many patients of Health Clinic A are transient and it is important that staff elicit from the recording system where they usually receive health care. Staff often enter Health Clinic A into this field, causing inaccurate information to be saved and used when creating reports specific to regular patients at this clinic. Alternatively, perhaps the staff could implement a system where a patient is identified as transient on PCIS until they have attended the clinic for more than 4 visits as they

previously did with the paper-based system before they were transferred to the actual patient folders.

The CCIS system inaccurately reported children that listed Health Clinic A as their usual health service provider. Further investigation into the discrepancies between CCIS and PCIS, revealed that CCIS had continued to list this clinic as the usual health service provider despite the fact that many children had received a majority and/or their latest immunisations from clinics other than Health Clinic A. Accurate versions of data held within CCIS can only be possible through successive audits.

Conclusion

This audit has identified discrepancies between the paper-based files, PCIS and CCIS*. It recognised that the system for follow-up at Health Clinic A needs improvement in respect to giving vaccines according to schedule and in following the catch-up regimen. This is particularly significant for ensuring timely administration of the rotavirus vaccination, which has yet to be successfully introduced into the vaccination schedule practised at this clinic. For such an improvement to occur support from the Immunisation Database is essential and this can only be effective if CCIS and PCIS reconcile.

Acknowledgement

Thanks to Clinic A staff and Charles Roberts for assistance with reports from and information about CCIS and PCIS.

Reference

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* A list of corrections to be made both in PCIS and CCIS have been forwarded to the, Immunisation Database Officer, for further action.

Childhood Vaccination Schedule as at 1 October 2006

(HPV handled as a special program)

NORTHERN TERRITORY DEPARTMENT OF HEALTH AND COMMUNITY SERVICES

Childhood Vaccination Schedule

Effective from 1 October 2006

	Hepatitis B Engerix B™	Rotavirus Rotarix®	Diphtheria Tetanus Pertussis Hepatitis B Poliomyelitis Infanrix®Penta	Haemophilus Influenzae type b PedvaxHIB™	Conjugate pneumococcal Prevenar®	Measles Mumps Rubella Priorix™	Meningococcal C Menjugate® NeisvacC®	Hepatitis A VAQTA®	Polysaccharide Pneumococcal Pneumovax23®	Varicella Varilrix®	Diphtheria Tetanus Pertussis Poliomyelitis Infanrix®IPV	Adult Diphtheria Tetanus Pertussis Boostrix®
● Birth	✓											
2 months		★ ✓	✓	✓	✓							
4 months		★ ✓	✓	✓	✓							
6 months			✓		✓							
12 months				✓		✓	✓	■ ✓				
18 months								■ ✓	■ ✓	✓		
4 years						✓					✓	
13 years										❖ ✓		✓
15 years									■ ✓			

Vaccine notes:

- ● = BCG for all Indigenous neonates, neonates who will live in Aboriginal communities, neonates of overseas-born parents from high TB prevalence countries who will be going back for extended visits and neonates of families who have been treated for leprosy.
- ● = Hepatitis B Immunoglobulin for all infants of Hepatitis B surface antigen positive mothers.
- ★ = Oral vaccine: first dose must be given by 14 weeks of age; second dose must be given by 24 weeks of age.
- ❖ = If no history of disease or vaccination.
- ■ = Indigenous only.

www.nt.gov.au/health/vaccination

Information:

For more information contact your nearest Centre for Disease Control (CDC):

Darwin	8922 8044
Katherine	8973 9049
Barkly	8962 4259
Alice Springs	8951 6907
East Arnhem	8987 0357

Northern Territory Government
Department of Health and Community Services

Review of BCGs given to babies born in Adelaide to women transferred from Alice Springs Hospital

Rosalie Schultz, CDC Alice Springs

Background

Bacille Calmette-Guérin (BCG) is recommended for all Aboriginal babies in the Northern Territory (NT). When babies are born in Adelaide, no system is in place for ensuring that BCG is received. Aboriginal women with high risk pregnancies are transferred from Alice Springs Hospital to Adelaide, and it is possible that their babies do not receive BCG.

BCG is on the recall list for children up to 6 months of age if the data base has not received notification of the immunisation being given in the hospital. The child drops off the recall list after 6 months and therefore the NT immunisation recording system is unable to provide reports on children who have not received BCG.

Methods

Hospital record numbers of all women transferred from the obstretric unit at Alice Springs Hospital to Adelaide Hospitals in 2005 were obtained. Non-Aboriginal women were excluded.

Babies of these women were identified by 'baby of' under CARESYS and CCIS records. CCIS was used to find out whether the baby had received BCG.

Where no 'baby of' a woman could be identified, the home clinic was contacted for identification details of the baby, in order to access immunisation records.

Results

20 women were identified as being transferred to other hospitals from the obstetric unit at Alice Springs Hospital during 2005. Of these, 12 were Aboriginal and 11 live babies were recorded.

Of these, 10 babies were documented in CARESYS or CCIS as 'baby of' the mother, and identification was available. All had BCG documented in CCIS. These were given at Alice Springs Hospital or by Centre for Disease Control, between 2 days and 11 months after the birth. Only 1 received BCG at age older than 6 months, and this baby had an 0mm Mantoux prior to the BCG.

There were 2 babies not identifiable in CARESYS, and the home communities of the mothers were contacted. One baby was deceased and the other baby had received BCG.

Discussion

Despite there being no formal system to note babies who may have missed BCG and no structures in place, either in the referring hospital or on return to an NT hospital for administering BCG to this cohort of babies, all babies received BCG. Most received BCG at earlier than 6 months of age, when Mantoux testing is not necessary. All received BCG by 12 months of age, when it has minimal effect on subsequent Mantoux testing.

This review was limited to babies of women who were identified as being transferred from the Alice Springs Hospital obstetrics unit. Women transferred outside the hospital were not identified in this way, and it is not possible to identify these women through this method. However, as all the babies identified in this method had received BCG, it is likely that a similarly high rate of BCG is received among babies born to other women who deliver in Adelaide.

Routine HIV screening: is it feasable for Australia?

Philippa Prior, medical student Melbourne University, CDC selective

The HIV/AIDS epidemic today constitutes a significant global crisis. By the end of 2003, 38 million people globally were living with HIV/ AIDS; with almost 3 million people dying from AIDS related illness. The vast majority of these infections occur in the developing world, and in particular there have been significant increases in Australia's nearest neighbours, Indonesia and Papua New Guinea.[1] This, coupled with an increase of 41% in the prevalence of HIV diagnoses in Australia in the last 5 years, has recently brought the issue back into the public consciousness.[2] It is therefore timely to be reconsidering the current HIV prevention strategies and particularly HIV screening in the light of recent changes in the United States (US) recommending routine HIV screening for all people aged 13-64 years.[3]

The United States has experienced a significant burden of disease due to HIV/AIDS since its emergence in 1981. In 2004 an estimated 1.2 million HIV or AIDS cases were reported to the Centres for Disease Control (CDC), with a total of 523,000 deaths among people with AIDS.[4] Despite a significant decrease in annual number of AIDS cases after their peak in 1994, this number stabilised during 1999-2004, and has since increased within America's racial/ethnic minority populations and those exposed through heterosexual contact during this time. In addition, an estimated 25% of all people living with HIV in the US are unaware of their infection, and the proportion of late diagnoses (diagnosis of AIDS within 1 year of HIV positive test) in 2004 was 39%.[5] As an example, Duffus[6] discusses the high rates of up to 41% of late HIV diagnoses in a South Carolina health facility and makes the point that the majority of these diagnoses were in people who would not otherwise have been tested under the risk-based screening program but who had ample opportunity in several visits to the health clinic over the time of their likely infection. This indicates that in America targeting specific populations has not been effective in early detection of HIV infection and consequently opportunity for timely access to medical care that can substantially improve the course of HIV disease.[3]

Early detection of HIV infection may also benefit the broader community by reducing transmission of the virus through safer sex practices, as Branson[5] quotes the annual transmission rate for persons unaware of their HIV status is 6.9% compared with 2% for those who are aware. These issues therefore prompted the CDC in America to revise their screening recommendations to advocate routine screening as a normal part of medical practice to try to plug the holes these people slip through.

Branson[7] outlines the case for HIV infection as a good contender for a screening program. It complies with the required criteria for a successful screening test: HIV is a serious disease that can be diagnosed before symptoms develop and has adequate treatment, the test for HIV is reliable, inexpensive and non-invasive, early detection can gain years of life for the patient if treatment is initiated early, and the benefits to the patient outweigh the cost of screening. In addition, routine HIV screening has already been proven to be successful in blood donors, where screening has almost eliminated transfusion-associated HIV infection in the United States, and perinatal HIV transmission rates can be reduced to less than 2% with antenatal HIV detection and prophylaxis.

Paltiel[3] has now proven that routine screening of all people aged 13-64 years would be cost-effective both clinically and economically if undetected HIV prevalence is higher than 0.2%. This is an important result as Paltiel[3] emphasises that for the majority of US states which have available data the prevalence exceeds this threshold and so would qualify for routine screening.

How relevant are these changes in HIV screening recommendations to the Australian HIV context? Paltiel[3] states that the undetected HIV prevalence in the screened population is the principal consideration in choosing to initiate a first screening. While not addressed directly by Paltiel, the 2 main methods of identifying the "undetected HIV" prevalence include the;

- Back-calculation method which uses the observed AIDS incidence data and

knowledge of the incubation period of HIV to estimate the undetected HIV infections necessary to account for these AIDS cases; and

- Sentinel surveys for seroprevalence of HIV from blood samples such as from civilian applicants for military service, childbearing women, ambulatory patients, Job Corps entrants, and federal prisoners in the US that are then adjusted for bias and compared to the known rate from HIV/AIDS notifications.

While data such as this may be being collected in Australia I was unable to find this information and thus it was not possible to draw any direct comparisons. There are, however, several important differences in the current HIV situations between these 2 countries that may help respond to this question.

The most important difference lies in the much lower HIV/AIDS prevalence in the Australian population. It now sits at one sixth the prevalence of the US and one third those of France and Canada.[1] The HIV/AIDS Annual Surveillance Report (2006) shows that in 2005 there were 240 AIDS diagnoses and 930 new HIV diagnoses, a far cry from the US numbers. This low prevalence has been attributed to the success in controlling the predicted epidemic when HIV first emerged in Australia. The peak in the number of new HIV infections in Australia occurred in 1984, almost 10 years before the US followed by a dramatic decline to a low stable incidence by 1994 when the US was still at its peak.[8] Plummer and Irwin[8] remark that this can be considered an important public health achievement for Australia due to, unlike in the US, successfully containing the epidemic within the group in which it originally emerged, gay men.

This low prevalence suggests that although the rate of undetected HIV in Australia is not known, it is unlikely to be at a rate high enough to recommend routine screening as a feasible option. Paltiel[3] estimated that to routinely screen the entire adult population with a low (<0.1%) prevalence of undetected HIV would cost $US100,000 per QALY (quality adjusted life year), significantly higher than the economically acceptable limit of $US50,000 per QALY.[5]

A second important difference between Australia and the US lies in the distribution of HIV/AIDS within the population. In the United States, racial and ethnic minorities now bear a disproportionate burden, with 51% of HIV/AIDS cases from 2001-2004 diagnosed among the black population and 20% among the Hispanic population.[4] The MMWR reports that these disparities cover all transmission categories including men who have sex with men (MSM), injecting drug users (IDU), heterosexual contact, perinatal and undetermined with higher rates in black males in all categories except MSM.[9] Rates are higher among black women in all categories, in particular high-risk heterosexual contact. While there could be multiple reasons for these disparities, one important factor is differential access to health care services which in turn leads to a higher proportion of late HIV diagnoses producing not only a poorer health outcome for the patient, but at a population level increases the likelihood of unknown transmission.[4] This situation strengthens the case for routine HIV screening in an attempt to avoid missed opportunities.

In contrast HIV/AIDS in Australia remains predominantly within the gay community. In 2005, sexual transmission among men accounted for 82% of newly acquired HIV infection, a 41% rise in the number of new infections in the past five years.[10] There have been a number of reasons suggested for the increase, among them a decrease in targeted health promotion leading to an increase in risk-taking behaviour by gay men as well as widely available antiretroviral treatment which may induce complacency. If proven to be the case, this situation suggests increased public health promotion strategies; targeted education and awareness campaigns may be more effective than routine screening programs. This approach is recommended by Plummer and Irwin[8] who suggest the most influential strategies used in the early days of HIV/AIDS was as a result of activism within the gay community long before most of the national public health strategies were implemented.

Indigenous rates of HIV fortunately remain similar to the non-Indigenous population and the overall number of infections remains small (185 since 1994) in contrast to the United States.[1] However, there are certain characteristics of the

distribution of HIV/AIDS within the Indigenous population that worryingly resemble the situation in the US. In contrast to the non-Indigenous population, the proportion of HIV infections acquired through heterosexual contact is much higher (34% versus 19%), as are rates among Indigenous women (33% versus 10.8% in non-Indigenous). A greater proportion of Indigenous cases were attributable to IDUs.[10] This presents a scenario that has the potential to produce an explosive HIV epidemic that could have serious consequences on a population already struggling under substantially higher rates of sexually transmitted infections (STIs).[11] The Indigenous population therefore represents one of the most important target groups in the risk-based screening program that is currently operating in remote Australia. In order to support screening Wright[11] emphasises the importance of access to primary health care for Indigenous Australians as well as community-wide education and behaviour change strategies.

In summary, the significant increases in HIV diagnoses in Australia in the last 5 years has once again brought HIV/AIDS prevention strategies under scrutiny. The recent revision of CDC's (USA) screening recommendations to introduce rapid-test screening of all people 13-64 years old prompted this review of the feasibility of such an option in Australia.
The undetected HIV prevalence in Australia needs to be calculated before direct comparisons can be made. The low prevalence in Australia and the differences in HIV distribution however suggest routine universal adult screening would not be a feasible option at this time.

Despite the problems that may exist with the present risk-based screening program that result in undetected HIV infections, it is still most likely the key strategy for a population with an overall low HIV/AIDS prevalence but with several well identified at-risk groups. It is only successful, however, if additional quality surveillance is maintained to ensure accurate identification of those people at risk. Health care workers must be vigilant in identifying at-risk people and instigating HIV tests. Finally, other prevention strategies must also accompany this approach. These include education and reinforcement of the safe sex message among identified risk groups such as gay men and sex workers as well as broad public health programs including for Indigenous communities and culturally and linguistically diverse (CALD) communities, and continuation of the successful Needle and Syringe Program for Injecting Drug Users.[1]

Acknowledgements

I would like to thank Dr Vicki Krause and Wendy Armstrong for their input and recommendations.

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Thinking of walking the Kokoda Trail? Take note!-Malaria in Kokoda Trail walkers

Rosalie Schultz, CDC Alice Springs

Introduction

Six young male workmates from Alice Springs walked the Kokoda Trail 20 to 28 June 2006, on a self-organised tour and none had been on the trail before. All took recommended doxycycline prophylaxis. Compliance was reported as excellent, with commencement prior to departure and continuation of treatment for 2 weeks following return to Australia. They also reported using recommended insect repellents consistently and sleeping in tents throughout the trail but they did not use mosquito nets. The group returned to Alice Springs via Cairns on 30 June.

Presentations

Kokoda walker 'A' presented to his GP on 27 July complaining of rigors, headache, myalgia, arthralgia, nausea, diarrhoea and malaise and was referred to Alice Springs Hospital. Blood film showed *Plasmodium vivax* malaria with parasite density 30/μL, while *falciparum* antigen was negative. Stool examination detected no pathogens.

After consultation with Infectious Diseases Physicians in Darwin, the patient, weighing 93 kgs, was treated with 3 days atovaquone/ proguanil, as no alternative oral anti-malarial treatment was available. Clinical response was slow and rigors continued for 24 hours after commencement of treatment. His G6PD screen was negative. After completion of the atovaquone/proguanil, eradication treatment with primaquine 15mg bd for 2 weeks was prescribed. The patient was educated regarding the reasoning and importance of finishing the course of primaquine.

All 5 fellow travellers were contacted and offered screening in response to case 'A' being diagnosed with malaria.

One of the 5, Kokoda walker 'B', presented unwell to his GP on 28 July, coinciding with the notification of malaria in his co-traveller. He complained of muscle aches, headache and fever. Blood film showed *Plasmodium vivax* malaria, with parasite density 124/μL, *falciparum* antigen was negative. He weighed 102 kg and also was G6PD negative. He was managed with atovaquone/proguanil, followed by primaquine 30mg bd for 2 weeks. He remains well.

The other 4 members of the group were screened but found to be negative on blood films, with negative *falciparum* antigens.

Kokoda walker 'A' suffered clinical relapse in mid-October, complaining of feeling run-down, achy and feverish, with diarrhoea and anorexia. It was noted that eradication treatment with primaquine had not been completed. He had been given only the first week's supply of primaquine with instructions to return for the second week's supply. He failed to return to collect the tablets for the second week. No parasites were seen on the blood film. He was re-treated on clinical grounds with an artemether-lumefantrine 6 dose regimen at 0, 8, 24, 36, 48 and 60 hours followed by primaquine 22.5mg bd for 2 weeks. This was completed and the patient remains well.

Discussion

No marked differences in behaviour were noted that might have increased the risk of disease in the 2 who developed malaria, and therefore the point is made that malaria prophylaxis reduces the risk of developing malaria and delays onset of symptoms of vivax, but does not reduce the malaria risk to zero.

Riamet™ or artemether-lumefantrine is not yet universally available throughout the NT and Australia although procedures are now in place for its procurement . This is most likely the reason why it was not used as first line treatment.

Primaquine doses are, as we learned, based on weight – so patient size needs to be taken into account on treating. Compliance with

primaquine is an important issue and improving adherence to taking the drug by addressing the cost, the capacity to dispense the full 2 week dose initially and assuring a basic understanding of why such a drug is needed are essential.

Acknowledgement

Cate Coffey's efforts in contact tracing, screening and follow up contributed to this work and are appreciated.

Vivax malaria: prevention and treatment not always straightforward

Nick Anstey, Menzies School of Health Research and Royal Darwin Hospital

Vivax malaria has been under-estimated as a public health problem in our region. New estimates suggest up to 270 million clinical episodes per year in South and South East Asia alone,[1] costing over US$2 billion in direct health costs and lost productivity.[2] Although commonly thought of as a benign infection, vivax malaria is responsible for high rates of anaemia in endemic areas, particularly in infants and pregnant women.[2] As a significant cause of low birthweight, vivax malaria causes an attributable indirect infant mortality.[2]

Vivax malaria also poses a significant risk to travellers, especially to those travelling to PNG, the Pacific and South-East Asia. The report by Rosalie Shultz in this issue of the *Bulletin* highlights the increasingly recognised risk of malaria in travellers to the Kokoda Trail. It also raises some important issues regarding the prevention, diagnosis and treatment of *Plasmodium vivax* in travellers.

Both patients were apparently compliant with their daily doxycycline prophylaxis. As with other commonly used malaria prophylaxis, doxycycline is effective in preventing blood stage infections of all species of malaria, but does not prevent the establishment of the latent liver stages (hypnozoites) of *P. vivax*. The time of presentation in both cases, 29-37 days after exposure, makes it likely that the initial blood stage infection was cleared without symptoms while still taking doxycycline prophylaxis, with the subsequent clinical presentations in each case resulting from the first relapse. In *P. vivax* acquired in Papua province, the first relapses start 21 days after initial blood-stage parasitemia[2]. These infections occurred in both patients after each had stopped doxycycline prophylaxis.The resultant blood stage infections and clinical episodes may have been prevented had the doxycycline prophylaxis been continued out to 4 weeks after return, as recommended in the Australian *Therapeutic Guidelines*.[3]

None of the currently recommended antimalarial prophylactic regimens will prevent latent stage infections with *P. vivax* from becoming established. Primaquine will prevent these stages but is not routinely recommended in Australia as prophylaxis.[4] This means that when travelling to vivax-endemic areas, particularly high risk areas such as the Kokoda Trail, there is a need to use multiple means of preventing infection. These additional measures are also strongly recommended to reduce the likelihood of exposure to *P. falciparum*. While the Kokoda travellers used insect repellents and tents, use of insecticide-impregnated bed nets would have further reduced their risk of infection.

Both patients were symptomatic with very low parasitemia. *P. vivax* has long been known to cause fever at a lower level of parasitemia than *P. falciparum*, with up to 10% of non-immune patients developing fever when their parasitemia is below the detection limit of microscopy.[5] While rapid antigen diagnostic tests are sensitive for the diagnosis of *P. falciparum*, they lack sensitivity for *P. vivax*. The first Kokoda patient's parasitemia was at the lower limit of detection by a skilled microscopist, and the diagnosis can be easily missed.

Chloroquine has been used as standard treatment of vivax malaria for 60 years. While slower to emerge than in *P. falciparum*, chloroquine resistance is now a major problem in *P. vivax* in our region. Up to 95% treatment failure is occurring in parts of Papua, Indonesia.[2,6] Reports of chloroquine treatment failure have emerged from most other vivax-endemic areas, particularly Indonesia and the Pacific.[2] For this reason the *Malaria Guidelines for Health Professionals in the Northern Territory* (Update

Box

New Northern Territory protocol for treatment of *Plasmodium vivax* acquired in our region (Indonesia, Timor Leste, PNG and Pacific)[7].

Artemether-lumefantrine 20+120 mg

Adult and child >34kg: 4 tablets (child 5-14kg: 1 tablet; 15-24 kg: 2 tablets; 25-34 kg: 3 tablets orally with fatty food, at 0, 8, 24, 36, 48 and 60 hours, making a total adult dose of 24 tablets in 6 doses.

Plus, to eradicate latent liver stages, after exclusion of G6PD deficiency, add concurrently:

Primaquine 30 mg (child 0.5 mg/kg up to 30 mg) orally daily, with food, for a minimum of 14 days or, if >70 kg, as needed to achieve a total dose of 6 mg/kg.

IN PRESS) have replaced chloroquine as first line treatment for vivax malaria, and now recommend artemether-lumefantrine as first line treatment for *P. vivax* acquired in Indonesia, Timor Leste, PNG and the Pacific[7] (**see Box**), as well as for *P. falciparum*. Artemether-lumefantrine has recently been shown to be safe and effective in treating chloroquine-resistant *P. vivax* in both adults and children[8] and was successfully used to treat the clinical relapse in Kokoda walker 'A' in the previous article.

Vivax relapses occur in up to 80% patients in South-East Asia and the Pacific[9] and cause significant morbidity to the individual. In contrast to the late appearance of gametocytes with *P. falciparum*, gametocytes of *P. vivax* appear at the same time as clinical illness. Relapses therefore pose the additional public health risk of the reintroduction of vivax malaria into malaria-receptive northern Australia.[7]

Primaquine is the only available drug that prevents vivax relapse. Although this is commonly commenced after the completion of drugs that clear the blood stages, clinical trials from over 50 years ago suggest that early administration of primaquine in conjunction with the blood-stage drug is required to maximise hypnozoite killing.[10] Primaquine tolerance is widespread across the island of New Guinea, requiring a higher total dose of primaquine.[2] The latest Guidelines from Australia[3] and the US CDC recommend a total dose of 420 mg over 14 days (30 mg/day) as standard anti-relapse therapy for all vivax infections in adults wherever the *P. vivax* has been acquired (after exclusion of G6PD deficiency).

Each of the Kokoda patients weighed over 90kg. Published and unpublished reports indicate a higher risk of failure with this regimen in those weighing over 70kg.[4,9] These data support the recommendation of a recent US CDC meeting report to use a higher total dose (6mg/kg) in those >70kg.[11] There are few published data to guide decisions whether to use a higher daily dose in heavy patients (as used in the Kokoda patients) versus a longer duration of therapy to achieve this. Some experts recommended extending the duration of therapy beyond 14 days if necessary to achieve the total dose of 6 mg/kg given the paucity of published safety data for daily doses over 30mg daily.[11] Others recommend 0.5mg/kg/day in these heavier patients.[4]

Stocks of artemether-lumefantrine (Riamet™) and primaquine needed to treat vivax malaria are now held at Royal Darwin Hospital, Katherine Hospital and Alice Springs Hospital. Malaria can be treated through these hospitals in consultation with the Infectious Diseases Services at Royal Darwin or Alice Springs Hospitals.

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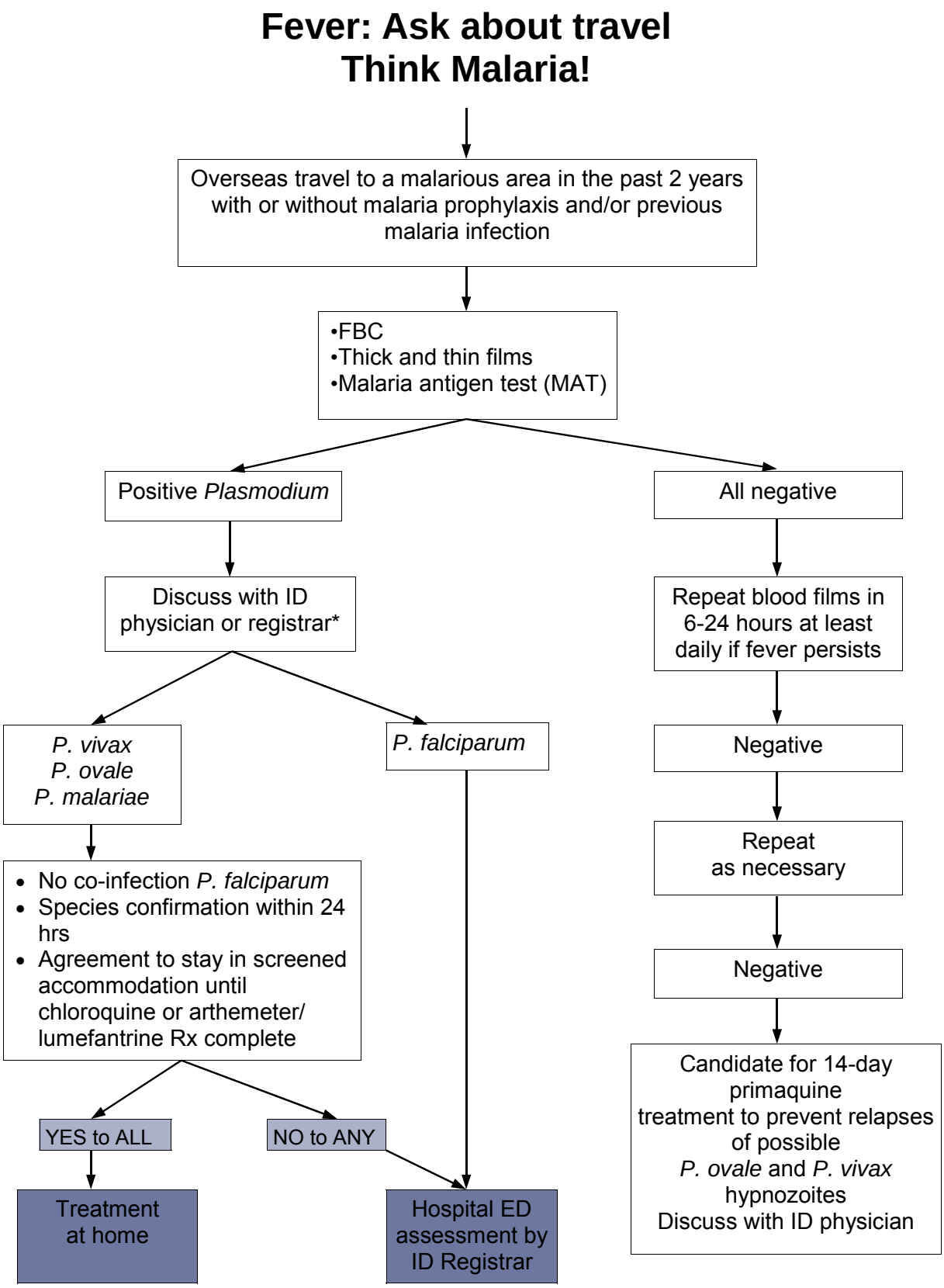
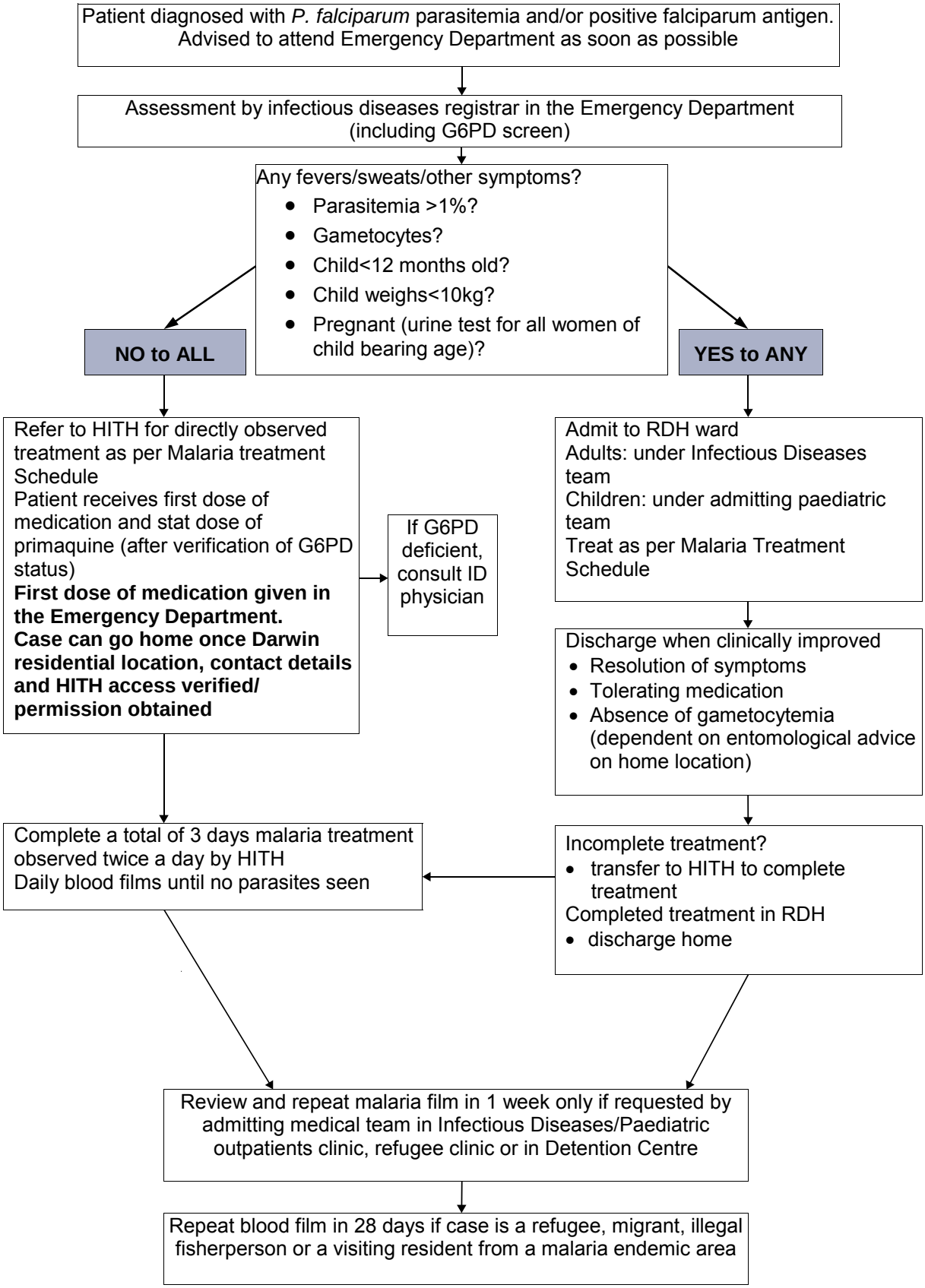
Malaria Guidelines for Health Professionals in the Northern Territory 2007

The following pages offer several of the revised algorithms from the 2007 updated *Malaria Guidelines for Health Professionals in the Northern Territory*, now available from Centre for Disease Control, Department of Health and Community Services and soon to be on the CDC webpage http://www.nt.gov.au/health/cdc/protocols.shtml.



* ID or medical registrar must discuss all cases with an ID physician at the time of presentation

Clinical management of *P. falciparum* Malaria



HOSPITAL - Medical Treatment of *P. falciparum* Malaria

CASE MUST BE DISCUSSED WITH ID PHYSICIAN (ALL HOURS)
DECISION TO ADMIT TO HOSPITAL

Patient cared for in air conditioning 6 pm - 8 am

P falciparum

Uncomplicated

Treatment
Non pregnant adults and children > 5kg
- 1st line: artemether/lumefantrine (Riamet)[1]
- 2nd line: quinine sulfate and either doxycycline (child > 8years) or clindamycin (child ≤ 8years)
- 3rd line: atovaquone/proguanil (Malarone)[1]
- 4th line: mefloquine

Pregnant women and children < 5kg
- quinine sulfate and clindamycin

- Daily parasite count until negative
- Daily blood glucose and full blood count
- Closely monitored BP and urine output
- Check for G6PD deficiency– if normal stat dose of primaquine prior to discharge

Complicated

Includes any of the following:
- Unable to tolerate oral medication
- Parasitaemia >2%
- Any signs of severe malaria:
  - ⇒ altered mental state
  - ⇒ jaundice
  - ⇒ renal impairment
  - ⇒ oliguria
  - ⇒ unable to sit unaided
  - ⇒ respiratory distress
  - ⇒ severe anaemia
  - ⇒ hypoglycaemia
  - ⇒ acidosis

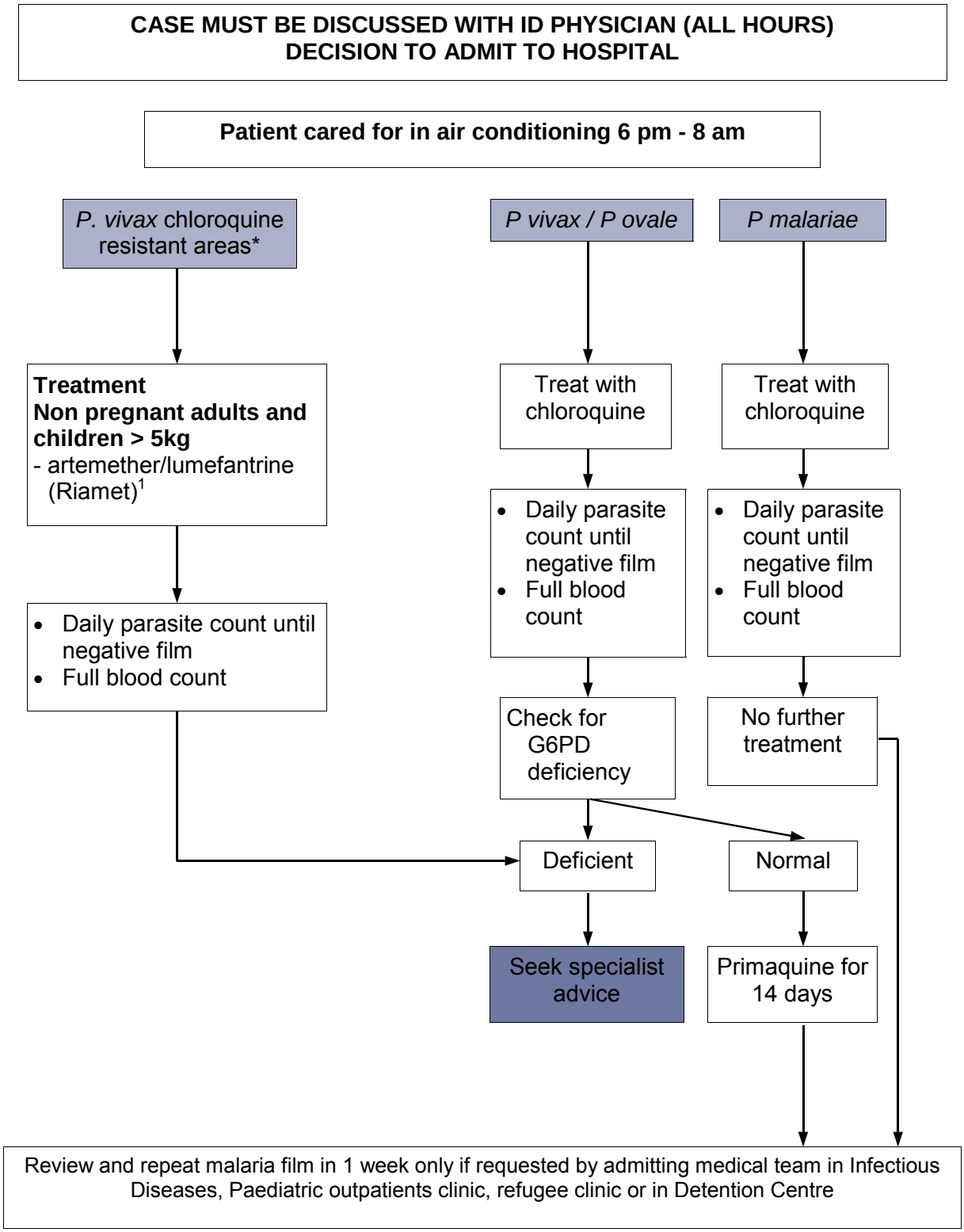
Admit to HDU/ICU
- 1st Line - IV Artesunate (Appendix 2)
- 2nd line– IV Quinine (See protocol in ICU)

Review and repeat malaria film in 1 week only if requested by admitting medical team in Infectious Diseases, Paediatric outpatients clinic, refugee clinic or in Detention Centre

In very selected cases consider 14 day primaquine therapy (if G6PD activity is normal) to prevent relapses of possible *P. ovale* and *P. vivax* hypnozoites

1. Give with milk, biscuits or fatty foods as fat increases the absorption.

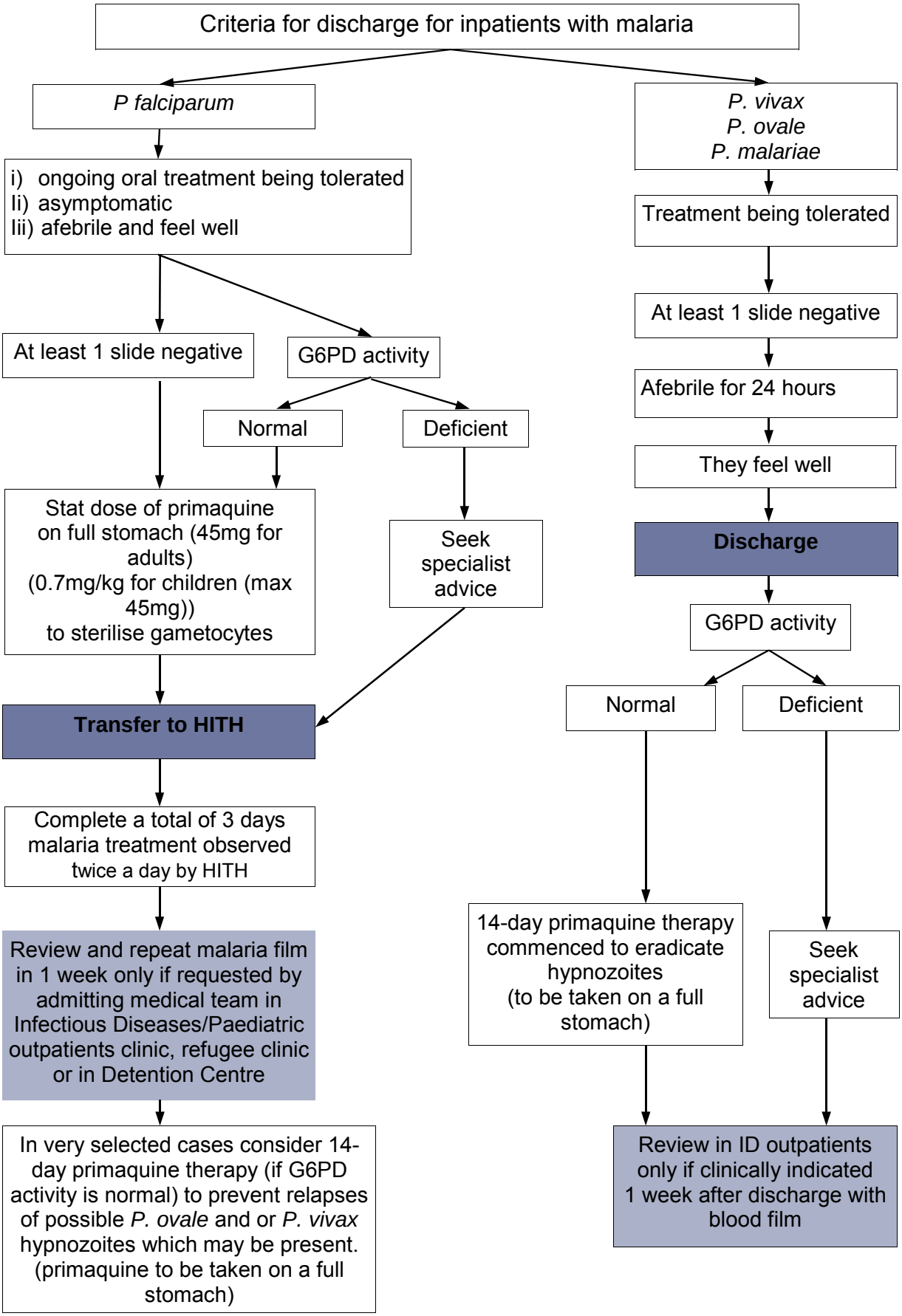
HOSPITAL - Medical Treatment of *P. vivax, P. ovale, P. malariae* Malaria



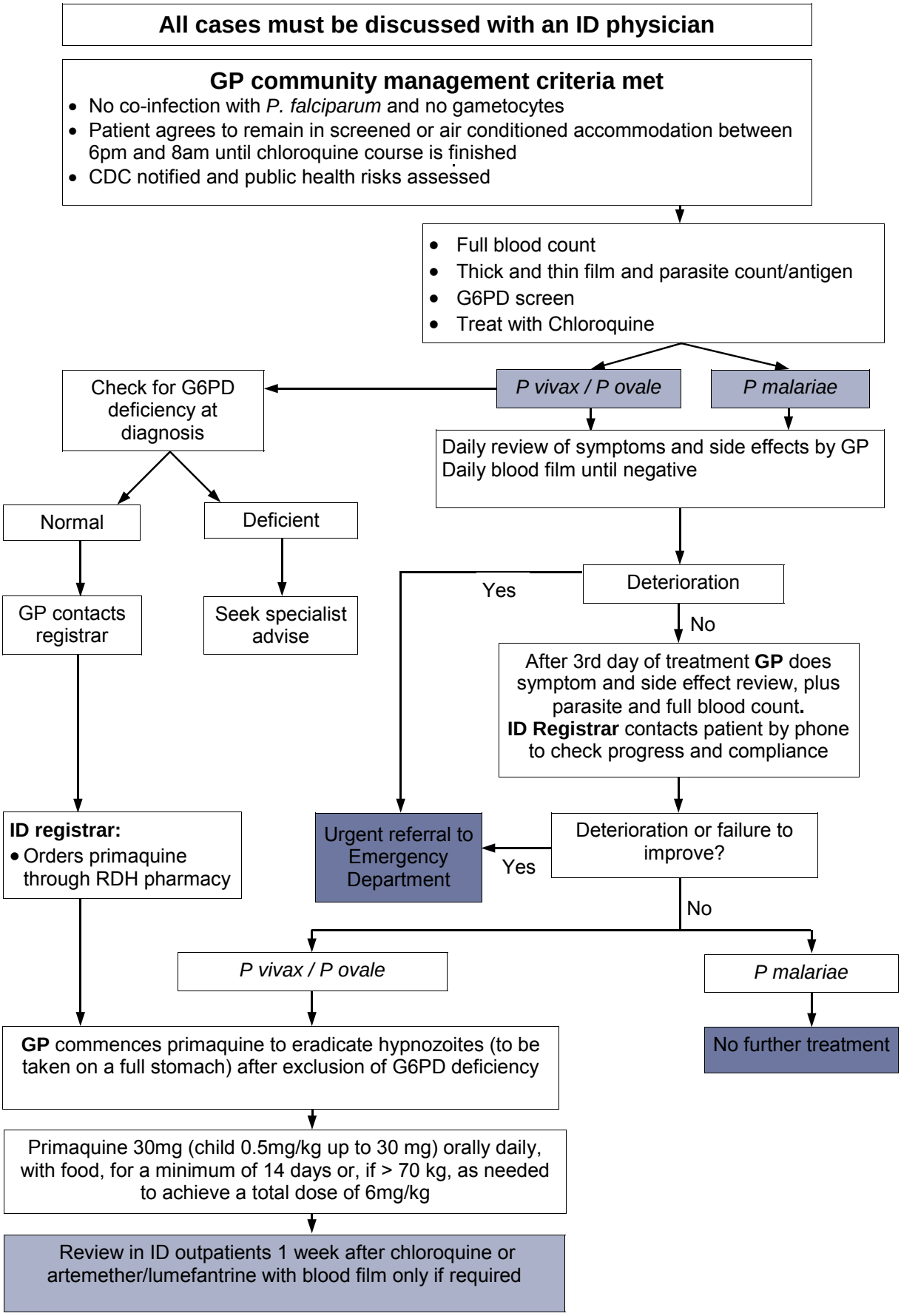
* Areas considered chloroquine resistant are Indonesia, Timor, Papua New Guinea and the Pacific.

1. Give with milk, biscuits or fatty foods as fat increases the absorption.

Hospital Discharge Plan



Community Medical Treatment of *P. vivax, P. ovale, P. malariae*



Fact sheet

Non-healing ulcers

Including those caused by non-tuberculous mycobacteria (NTM)

Many different medical conditions can cause non-healing ulcers. The conditions range from vascular disease and diabetes to foreign bodies, autoimmune diseases, cancer and infections. In the Northern Territory, some non-healing ulcers may result from diseases usually not experienced in temperate southern zones. Awareness is required to consider and accurately diagnose the cause of the ulcers and provide appropriate treatment. Seeking early medical attention with an ulcer that is not healing is important, particularly for consideration of underlying causes and to take appropriate diagnostic samples or swabs. In addition, ulcers seen at an early stage, in general, can be treated much more easily than larger ulcers.

What diseases cause non-healing ulcers?

Diseases that commonly cause non-healing ulcers are vascular disease, diabetes, skin cancers and some infections. In the tropical climate of the Northern Territory, melioidosis and non-tuberculous mycobacterial (NTM) skin infections can also cause non-healing ulcers as well as leprosy which has not been eliminated from the Indigenous population.

Vascular Disease

The majority of chronic leg ulcers are from venous insufficiency, arterial insufficiency or a combination of both. Older people, particularly if they are, or have been smokers, may have disease of their arteries that reduces the flow of blood particularly to their lower legs and feet. These people often experience cold feet, and sometimes pain in their legs on walking. People with vascular disease with minor abrasions of their lower limbs can develop non-healing ulcers. Their impaired blood supply to the affected area reduces the body's ability to provide the healing response that normally follows an injury.

Diabetes

Non-healing ulcers commonly occur in people who have diabetes, particularly if their diabetes is poorly controlled and they smoke. Poorly controlled diabetes may result in vascular disease of the arteries that reduces the body's ability to provide the healing response that normally follows an injury. Poorly controlled diabetes can result in the loss of sensation particularly to the lower limbs and feet, which results in people not being aware of any cuts or burns to their feet. Diabetes reduces the body's overall ability to heal injuries and to prevent and combat infection. Poorly controlled diabetics therefore are more prone to injuring their lower limbs, and developing non-healing ulcers.

Skin Cancers

Skin cancers can also present as a non-healing lesion or ulcer and early medical attention in this setting is particularly important. Skin cancers seen and treated at an early stage, normally result in a cure. A delay in seeking treatment may result in the need for more extensive surgery, and the possibility of invasive disease.

Melioidosis

In tropical areas, the bacterial infection melioidosis, in addition to causing potentially fatal pneumonia and septicaemia, can also result in non-healing skin abscesses and ulcers. These occur mainly by direct inoculation from the environment. Early medical attention and specific antibiotic treatment is important to the management of this condition.

Non-tuberculous mycobacteria (NTM)

This group of organisms cause uncommon mycobacterial diseases seen both in temperate and tropical zones. In addition to pulmonary

disease, NTM can cause lymphadenitis (swollen glands), wound infections and non-healing skin ulcers.

Exactly how the mycobacterial infections occur has not been well established, but the organisms are found in e.g. soil and water. There is no evidence of person-to-person transmission of these infections. Outbreaks have occurred and have been linked to contaminated hospital water supplies, or surgical equipment, spas and to some regional geographic areas.

In the Darwin – Palmerston region a cluster of cases of NTM skin ulcers affecting children has been noted. Risk factors associated with acquiring these skin NTM infections are still to be determined.

Clinical Presentation of NTM skin ulcers

NTM skin ulcers typically present with an initial lesion that may suggest a mosquito bite. This then develops into a non-healing skin lesion or ulcer. In the Northern Territory these lesions to date have mainly been in healthy children residing in the Palmerston-Darwin residential areas. In each case there has been no apparent history of injury, and the lesions have typically been on the upper limbs or torso. Organisms responsible have included *Mycobacteria fortuitum* and *M. ulcerans* (*M. ulcerans* lesions are also known as Buruli or Bairnsdale ulcers).

Management of NTM skin ulcers

NTM skin ulcers are uncommon and do not heal with the use of standard antibiotics. The identification of an NTM ulcer is confirmed through the presence of acid-fast bacilli on microscopy and culture and/or PCR from a wound swab or biopsy.

The management of NTM skin ulcers requires surgical excision of the ulcer and in some cases the addition of a prolonged course of specific antibiotic treatment. On referral, the management of NTM skin ulcers is undertaken through the Centre for Disease Control Darwin, normally in conjunction with a surgical specialist.

Leprosy

Leprosy is a chronic mycobacterial disease of the skin and peripheral nerves. Leprosy is now uncommon in the Northern Territory, however occasional cases still occur. The involvement of the peripheral nerves can lead to loss of sensation particularly affecting the hands and lower limbs. As in diabetes, the loss of sensation results in people not being aware of any cuts or burns that they may sustain. For this reason people with leprosy are more prone to developing hand and lower limb injuries, which may develop into non-healing ulcers. Leprosy always needs to be considered in the presentation of a non-healing ulcer, especially in the Indigenous population or those from countries where leprosy has not been yet eliminated, such as Myanmar, Brazil, India, Madagascar, Mozambique, Nepal and Nigeria.

Other infections

Non-healing ulcers can also occur in nocardia and actinomycosis infections, chromoblastomycosis (deep skin infections from various fungi), and from resistant organisms such as methicillin resistant *Staphylococcus aureus*. They may also represent an underlying chronic infection such as osteomyelitis or of the presence of a foreign body.

Fact sheets with further information on leprosy and melioidosis can be found on http://www.nt.gov.au/health/cdc/fact_sheets/fact.shtml.

For further information contact the CDC Clinic in your region:

Alice Springs:	8951 7548
Darwin:	8922 8804
Katherine:	8973 9049
Nhulunbuy:	8987 0282
Tennant Creek:	8962 4259

The Big Wet

Kunbarllanjnja (Oenpelli), Jabiru Outstations (Patonga & Mudginberri), Corroborree, Marrakai and Adelaide River Township Floods March 2007

Public Health Response

Barbara Klessa, Xavier Schobben, Alexandra Mullins, Ken O'Brien, Joshua Cufley, Chris Luthy, Michael Bethune, Environmental Health, Darwin

In early March 2007 unprecedented rainfall in the north of the Top End caused widespread flooding which left Kunbarllanjnja (Oenpelli), Jabiru Outstations (Patonga & Mudginberri), Corroborree, Marrakai and Adelaide River cut off and for many residents, inundated their homes.

The Regional Counter Disaster Public Health Teams were called to action and the following report is a record of observations, actions taken and lessons learnt.

On 5 March 2007, Xavier Schobben, Director Environmental Health and Alexandra Mullins, Environmental Health Officer, flew to Kunbarllanjnja in response to the reports of the flooding. The Environmental Health team was accompanied by officers from Power Water Corporation, Department of Planning and Infrastructure (DPI), Department of Employment, Education and Training (DEET) and the Teacher's Union.

There were 67 homes confirmed as being flooded and 47 houses had been evacuated since Friday 2 March. About 97 people had been displaced and were accommodated at the Youth Centre, the Learning Centre opposite the Council or with relatives or friends. Nurses, teachers, contractors and community members had lost their homes to the floodwaters.

The major public and environmental health considerations, post flooding, are food safety and security; water quality; hygiene and sanitation; waste management; and disease control.

The Environmental Health Team provided advice to the community on:

- Cleaning up after the flooding;
- Melioidosis; and
- Management of a chemical hazard, involving flood affected poisons stored in a shipping container. The Chemical Adviser, Department of Primary Industry, Fisheries and Mines (DPIFM) and the Department of Health and Community Services (DHCS) Poisons Section, provided advice to the Council.

The Environmental Health Team met with the Community's Chief Executive Officer, Bill Medley, and his Community Development Employment Program (CDEP) Manager and Housing Officer to co-ordinate a response to returning displaced persons to their homes as soon as possible. A major issue addressed at the meeting related to appropriate safety equipment for clean up workers. The delivery of clean up materials was inspected and found to be short of safety boots, overalls and heavy-duty gloves. Safety boots were subsequently ordered by the emergency services co-ordinator (Officer in Charge, Oenpelli Police). In the case of the overalls and gloves the Chief Minister's office asked Environmental Health to make arrangements for these items to be procured and delivered to the community in order to relieve pressure on the welfare team who were busy procuring beds and whitegoods. Mobile (CDMA network) phones became valuable commodities in relaying timely information to DHCS management and other NTG authorities at this time.

On 5 March 4 CDEP teams, each consisting of a supervisor and 10 workers, also commenced work in cleaning out houses from which the floodwater had receded. They were aware of the hazards of working with limited personal protective equipment (PPE) but had to commence the work.

The availability and safety of food and water are important considerations post emergency or disaster. In order to assess the suitability of the food supply to the community a meeting was held with Tracy Buck the community store manager. The Store still had plenty of food with the exception of fresh fruit and vegetables. Fresh juice and cheese was expected to run short later in the week. Fresh meat was being prepared through the community's meatworks. Bread would soon be in short supply as the store

normally buys its stock from Kakadu Bakery in Jabiru, but they were running out of flour themselves while the highway was cut off. The opening of the Kakadu highway within a few days alleviated this situation and fresh bread could be flown in to Oenpelli. The floodwater nearly affected all the food contained in a large secure shed at the rear of the store, but quick action by scores of community volunteers saw this food quickly transferred to the large freezer room in the Store. The Store still had some products available for use in cleaning houses. The Council store was also providing a hot take-away meal daily to all displaced people.

Water quality was found to be satisfactory with 0.7ppm residual identified by Power Water staff in the reticulation. Further water samples taken subsequently verified the water supply to be safe.

Sewerage pumps were in working order although two were submerged and subject to water ingress.

Concerns were discussed regarding the potential melioidosis risk and need for community members and workers cleaning houses to wear footwear and to avoid wading in muddy water, particularly anyone with cuts or lacerations on their lower body. The Environmental Health team distributed floodwater advice notices to the Council, Clinic and Police station.

Cleaning up had been taking place throughout the community and little rubbish was to be seen. The social club recycled beer cans that floated away during the flood, along with the empty kegs. These had been collected and any littered areas were cleaned up.

A temporary tip had been established on the road into the community. Environmental Health inspected the site later and found all waste had been moved to the normal tip site, which was now accessible.

Meetings were also held with the clinic nurse, Heather Keeley and clinic GP, Dr Hugh Heggie, regarding the public health aspects of returning to flood affected houses. Issues discussed related to potential contamination of houses where sewage had surcharged, or sewage had overflowed the internal house plumbing, at some low-lying houses around Banyan Camp.

A meeting was held with the manager of the Gunbalanya Sports and Social Club, Mr Alex Siebert and his wife, regarding disposal of alcohol, re–opening the club and renovating the flooded accommodation.

Another meeting was held with Mr Anthony Murphy, the Manager of Injalak Arts Centre. The office and some artwork were flooded and currently damaged stock and office materials are being cleaned out. The women's toilet had been closed as it had surcharged and a clean up was underway. An electrician visited Injalak on 6 March, to check safety before business could resume.

Back in Darwin on 5 March 2007 a Recovery Coordination Working Group was established to coordinate Northern Territory Government assessment and recovery activities. Meetings took place in NT House at 7:30 am each day until such time as the recovery was stood down.

Breaking news was that not only Oenpelli had been flooded. The floodwater had also affected Jabiru Outstations, the Marrakai/Corroboree rural residential area and the Adelaide River Township. Jabiru Outstations were inaccessible and residents had been evacuated to various locations around Jabiru. Reports were that no one was in imminent danger so the public health response was simply one of providing information and advice on request. The Marrakai area was completely isolated due to the Arnhem Highway being cut off on either side of the community but the community itself was not under water. The police from Humpty Doo were ferrying food supplies by boat.

It was unknown how Adelaide River Township had fared so an Environmental Health team of two Environmental Health Officers (EHO's) Ken O'Brien and Michael Bethune were deployed to assess the situation and report back. They visited the clinic, school, Amangal Community and generally drove around the accessible roads to see if any houses and businesses had been inundated. If food premises had been inundated it was likely that power supplies would fail and any refrigerated or frozen food would need to be condemned. Fortunately this was not the case and although some floodwater had entered premises it did not damage any stock. In addition it was noted the local sewage ponds had not been flooded and

that the floodwater in the town was not effluent rich. Some areas were inaccessible and a decision was made to revisit after reports were received that floodwater had receded in order to assess any needs of local residents on rural blocks. There was particular concern regarding septic tanks and bore water supplies.

By 8 March the Kakadu Highway had reopened with some restriction on vehicle weight. The same Environmental Health team drove out in the company of an officer from the Welfare Recovery Group. The intention was to survey as many outstations as possible and assess the condition of the relief accommodation in which the evacuees were staying.

Where possible, all main outstations had been totally evacuated to Ranger Station accommodation and the Jabiru Township. All facilities were handling this increased loading well. Only smaller outstations such as Cannon Hill and Spring Peak remained partly occupied where it was logistically impossible to evacuate and people were totally cut off. In these circumstances food and provisions had been organised via food drops.

Alexandra Mullins was continuing to provide an almost daily service to Oenpelli depending on accommodation and seats on flights. She provided a support service of public health information to the community and checked houses to ensure they were suitably cleaned prior to being reoccupied. Barbara Klessa, Manager Environmental Health Top End, accompanied her on 12 March and they undertook a mosquito larvae survey of the community and surrounding areas. There was no evidence of mosquito breeding within the flooded areas of the community. There was some ponding around the spillway to the sewage ponds located about 3km from the community. The area was expected to dry up fairly quickly as the weather improved. No immediate threat was considered from the increased mosquito breeding. However, there is always a risk of mosquito bites and the public health team provided mosquito repellent for distribution to workers and community members who could not afford to purchase their own.

As the houses were drying out from being pressure-cleaned mould started to appear on surfaces. The EHO developed an information sheet and gave practical advice to householders for removing new mould growth.

On 20 March the replacement goods started to be delivered to Oenpelli and the public health response was withdrawn as the community was quickly returning to normal functionality.

On 20 and 21 March, a separate Environmental Health team, comprised of EHO's Joshua Cufley and Christopher Luthy, visited Jabiru to follow up on the surveys carried out by the previous team.

The Acting Manager at the Jabiru Health Clinic had anticipated there would be an increase in gastrointestinal illnesses and infections. When revisited, however, the Manager found no increase in the number of clinic presentations. Numbers may have actually decreased, presumably due to the level of accommodation afforded by Parks and Wildlife to the evacuees and the additional public health precautions being taken.

Damaged houses were under repair and it was anticipated that residents would return home in the near future. No further visit was scheduled as part of the disaster response.

A debrief meeting for the residents of Adelaide River Township and Amangal Community was organised by Police and attended by Environmental Health and the Welfare Recovery Coordinator. Barbara Klessa provided information and responded to public health queries. Most community members were older and long-term residents and took some pride in describing how they responded to the rapidly rising floodwaters. Only 1 property was damaged beyond repair and Barbara Klessa arranged for an EHO to inspect and report.

Ken O'Brien revisited Adelaide River on 27 March and Yilli Rrerung Housing, the housing association responsible for Amangal have the repairs under way.

At the Health Clinic the nurse in charge, Joy Sami, reported some increase in the number of attendances for colds and influenza but no apparent increase in diarrhoea or gastroenteritis. The rural block resident receiving National Disaster Relief Assistance (NDRA) for loss of

her dwelling will also receive a new septic tank as hers was damaged beyond economic repair. No further visit was scheduled as part of the disaster response.

A debrief meeting at Marrakai Bush Fire Station (shed) took place on Sunday 1 April. Environmental Health attended with the Welfare Recovery Coordinator, Police and NTES. Local residents felt they were well prepared for floods, as they knew the area was prone to floods. They reported that they have positioned and designed their homes to remain above the water levels. This proved to be the case in this event.

In conclusion, the overall public health response was extremely successful due mainly to valuable knowledge and experience gained in responding to similar previous events, as well as good preparation, planning and quick action. The Environmental Health teams were well received at all locations and able to provide timely information and advice and play a crucial role in assisting disease prevention.

Cleaning Up Floodwater

- Do not swim in floodwater and ensure that you and your children stay away from creeks and storm-water drains.
- Wear gloves and covered shoes when cleaning up after a flood, and treat any cuts immediately with an antiseptic.
- Wear a mask over nose and mouth when using a hose or high pressure hose to clean up after floods, to avoid breathing contaminated water droplets.
- Avoid unnecessary contact with mud and dirt.
- Disinfect all surfaces after cleaning up silt and debris.
- Thoroughly clean and disinfect refrigerators and food storage areas.
- Thoroughly clean with hot water and detergent, any cooking and eating utensils in contact with floodwater.
- Throw out flood-damaged food.
- Always wash hands with soap and water before handling food and after handling any contaminated objects or pets that may have been exposed to contaminated floodwater.
- Have an electrician check and ensure that the electrical system is safe prior to re-occupation.

March 2007

NT Malaria notifications October to December 2006

Merv Fairley, CDC, Darwin

Fourteen notifications of malaria were received for the fourth quarter of 2006. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemoprophylaxis was used.

Number of cases	Origin of infection	Reason exposed	Agent	Chemoprophylaxis
2	Indonesia	Fisher	*P. falciparum*	No
1	PNG	Holiday	*P. falciparum*	No
1	PNG	Relapse	*P. vivax*	Yes
3	Guinea	Refugee	*P. falciparum*	No
1	Mumbai	Resident	*P. falciparum*	No
4	Tanzania	Refugee	*P. falciparum*	No
1	Zimbabwe	Resident	*P. falciparum*	Yes
1	Tanzania	Refugee	*P. falciparum* *P. malariae*	No

Severe skin reactions from the sap of NT tree *Diospyros maritima* Blume

Peter Whelan, Medical Entomology Branch, CDC Darwin.

Summary

During excavations of an earth trench in Darwin, 2 plumbers suffered severe skin reactions on their legs. Investigations of plant roots from the inside of the wall of the trench indicated that sap from the Northern Territory (NT) native tree *Diospyros maritima* in the family Ebenaceae was the cause of the skin reactions.

Initial Exposure

Two plumbers were excavating an earth trench in sandy loam soil in early February 2003 in a retirement village in the Darwin suburb of Tiwi. The trench was approximately 500 mm deep and the plumbers were working inside the trench with bare legs. While working in the trench, they reported instant pain reactions similar to a bite or burn. Within 2 hours extensive blistering appeared on the legs and the burning sensation continued for 3 days, accompanied by constant but slight pain, with the affected skin sensitive to the touch. The affected skin took 1 week to scab and begin healing, (Figure 1). The plumbers reported the incident to the Medical Entomology Branch of Department of Health and Community Services (DHCS) to investigate a possible insect cause.

Investigation

Skin reaction to Roots

The trench was investigated 2 days after the initial exposure. No likely insects were observed. However there were many small fibrous black roots 2-10 mm in diameter at the level of the affected skin on the legs. I severed a cut exposed root 5mm in diameter from the trench edge and exposed the proximal end of the root linearly across the inside of my wrist. There was only a little sap in the root. There was no immediate sensation or pain. After approximately 2 hours the skin began to appear slightly red and became progressively redder over the next 12 hours, appearing like a burn, although there was no blister and the skin was not raised. After 3 days the skin was still dark red but beginning to fade.

Skin reaction to unripe Fruit

The roots belonged to a tree growing near the edge of the trench, (Figure 2). I took a fully developed but unripe dark olive green coloured fruit from the tree, squashed the hard fruit on a linoleum floor and rubbed the very dark green olive coloured fruit extract lightly in a line across the inside of my wrist adjacent to the root extract application site. The fruit extract left a bright yellow stain on the linoleum floor. There was no noticeable pain or sensation on the skin. I left the extract on the wrist for 30 minutes and then washed it off with soap and water. After 2 hours the skin appeared red and was slightly raised where contact had been made but there was no burning sensation. The skin became progressively redder but without blistering over the next 4 hours and stayed raised and sensitive to touch for 4 days, after which the skin started to heal. Photos were taken of the wrist on day 2 and day 4 after the fruit application, (Figure 3 and Figure 4).

Figure 1. Plumber legs 1 week after contact Healing and scab peeling

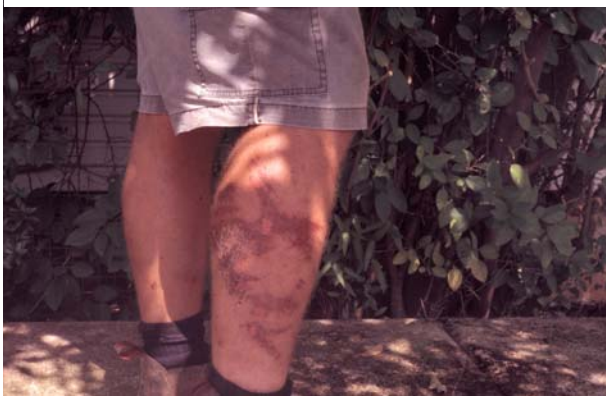


Figure 2. Leaves root and fruit *Diospyros maritima*

Figure 3. Day 5 reaction from root left hand side Day 2 skin reaction from fruit right hand side

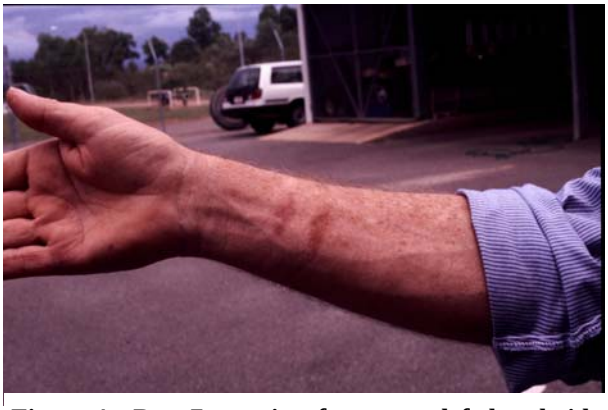


Figure 4. Day 7 reaction from root left hand side Day 4 reaction from fruit right hand side

The plant

The plant was identified by Mr Robert Howard of the NT Herbarium as *Diospyros maritima* Blume. This species is listed as present in the Darwin region, Arnhem Land and Melville Island, as well as in Queensland, Indonesia, and Samoa. It is present in the NT in the coastal region on sand dunes above high tide and in monsoon vine forests on stabilised foreshore or on the landward fringes of mangrove forests. It is a small compact tree 5-8 m high with dark green glossy leaves on the upper surface, and dull light green on the under surface with wavy margins. The fruit is a smooth globular berry with a cup shaped persistent calyx. The berries are dark green to orange when fully developed and turn black on ripening (Figure 2).[1]

Discussion

The skin reaction experienced by the plumbers was severe and similar to a chemical burn. The likely explanation of their reaction was that their legs received applications of sap from the recently severed roots of *Diospyros maritima*. The root application test to the wrist confirms roots as the source of the causative agent.

The root application to the wrist did not cause immediate pain or blistering as experienced by the plumbers, which may be due to the reduced amount of sap probably present in the severed root.

The wrist application of the sap from the root and the unripe fruit caused a similar skin reaction, indicating that fruit may have less of the active agent than the roots. However it is also possible that the washing of the skin reduced the reaction from the fruit. These tests indicate that sap from all parts of this plant may cause severe skin reactions. This could be particularly dangerous if unripe fruit was tasted or eaten by people.

The berries of this species are not eaten by Aboriginals, although the roots are scraped and boiled for a dye.[2] It would be interesting if people undertaking this practice experience skin problems or take precautions in relation to exposure to the sap.

This tree species is very attractive and has been used as a feature tree in Darwin. This species, and indeed any of the genus *Diospyros* are not listed by the Poisons Information Centre in Queensland as being toxic to people. It is possible that other members of this genus can cause similar skin reactions. It is recommended that the Poisons Information Centres and plant nurseries distributing this species, and any of the *Diospyros* species, are made aware of possible skin effects from the sap of this plant. Other species of the *Diospyros* genus in Australia should be assessed for possible severe skin reactions.

Acknowledgments

Thanks to the staff of All Hours Plumbing for reporting this incident and allowing photographs of affected legs.

References

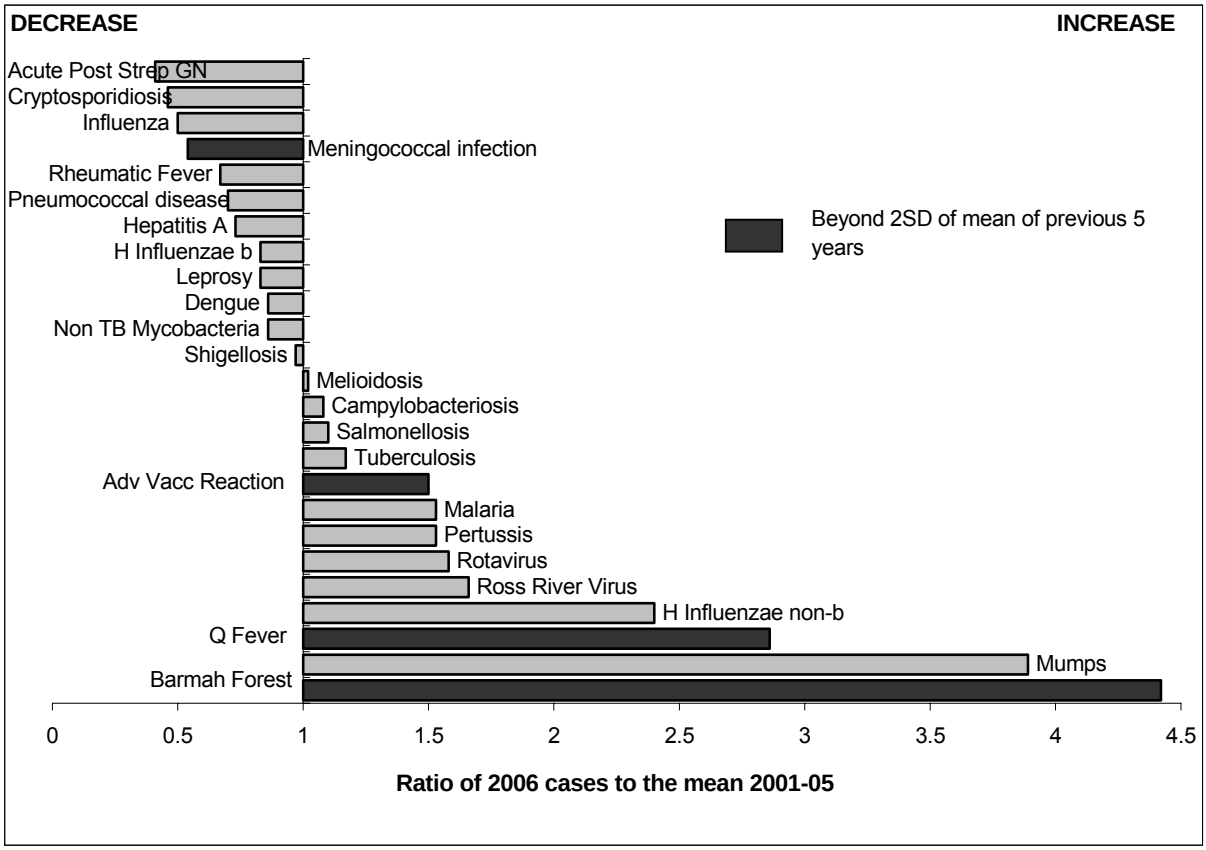
1. John Brock 1988, *Top End Native Plants*. John Brock.
2. Dulcie Levitt 1981, *Plants and People; Aboriginal uses of plants on Groote Eylandt.* Aust

NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS 2006 and 2005

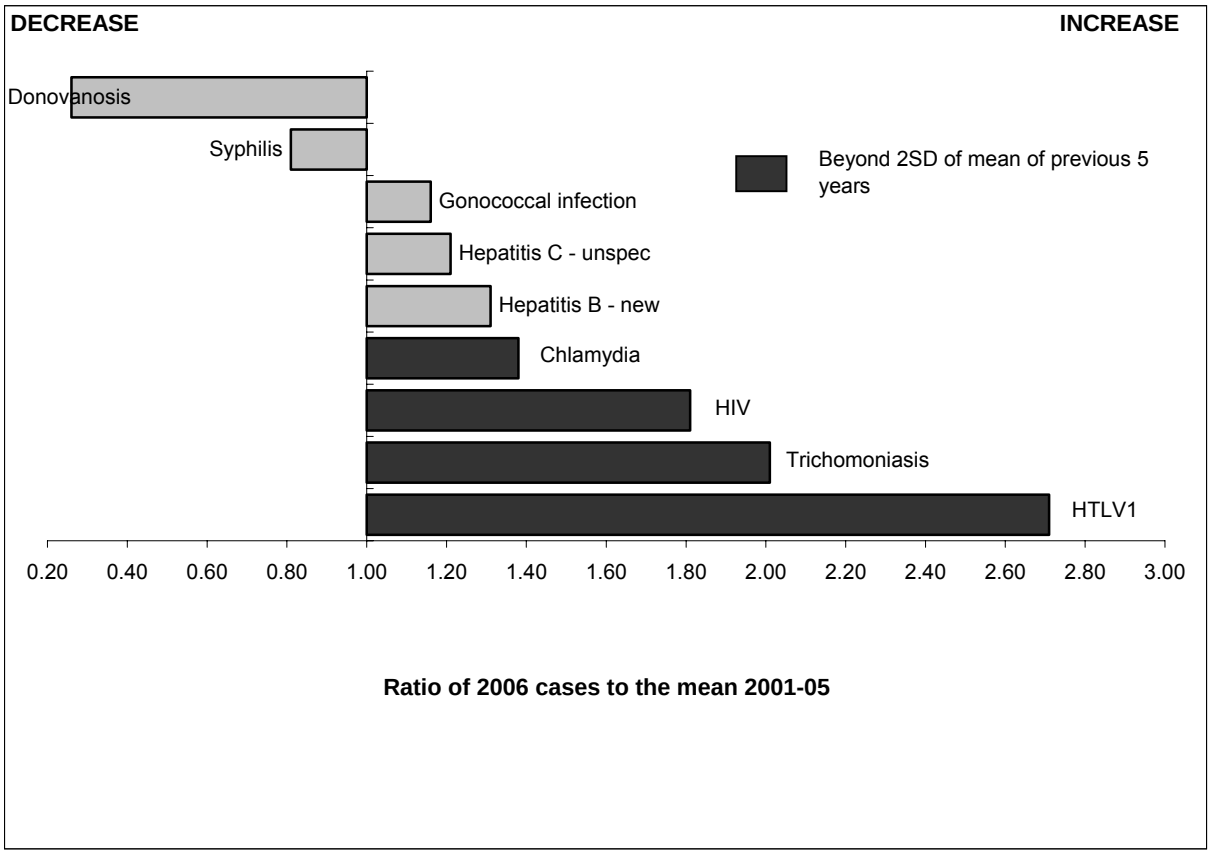
	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		NT	
	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
Acute Post Streptococcal GN	0	25	1	0	10	49	1	19	0	9	**12**	**102**
Adverse Vaccine Reaction	12	0	3	0	19	22	8	3	2	3	**44**	**28**
Amoebiasis	0	0	0	0	2	0	0	0	0	0	**2**	**0**
Barmah Forest	22	10	3	0	83	34	14	4	8	3	**130**	**51**
Campylobacteriosis	56	110	6	4	167	101	10	4	26	36	**265**	**255**
Chickenpox	18	–	0	–	92	–	22	–	60	–	**192**	–
Chlamydia	874	704	23	32	856	592	167	167	154	131	**2,074**	**1,626**
Chlamydial conjunctivitis	4	9	0	1	9	11	1	8	10	13	**24**	**42**
Creutzfeldt-Jakob Disease	0	0	0	0	1	0	0	0	0	0	**1**	**0**
Cryptosporidiosis	25	31	1	1	19	37	18	3	7	11	**70**	**83**
Dengue	1	0	1	0	18	14	2	0	0	0	**22**	**14**
Donovanosis	2	2	0	1	0	1	0	0	0	0	**2**	**4**
Food/water borne disease	0	0	0	0	0	0	0	4	0	0	**0**	**4**
Gastroenteritis - related cases	0	0	0	0	0	1	1	7	0	0	**1**	**8**
Gonococcal conjunctivitis	1	0	0	1	1	3	1	1	0	0	**3**	**5**
Gonococcal infection	1,031	1,017	46	46	393	431	131	125	192	187	**1,793**	**1,806**
Gonococcal neonatal ophthalmia	0	1	0	0	1	1	0	0	0	0	**1**	**2**
Hepatitis A	1	42	0	1	15	15	2	2	12	6	**30**	**66**
Hepatitis B - chronic	100	109	1	0	112	94	90	25	20	19	**323**	**247**
Hepatitis B - new	2	1	0	0	4	3	3	0	2	1	**11**	**5**
Hepatitis B - unspecified	94	51	1	1	51	62	31	39	14	7	**191**	**160**
Hepatitis C - chronic	1	8	0	0	1	7	0	2	0	0	**2**	**17**
Hepatitis C - new	2	0	0	1	1	1	0	1	0	0	**3**	**3**
Hepatitis C - unspecified	51	35	4	2	192	192	4	9	17	13	**268**	**251**
Hepatitis not otherwise specified	0	0	0	0	1	0	0	0	0	0	**1**	**0**
***H. Influenzae* b**	1	1	1	0	0	0	0	0	0	0	**2**	**1**
***H. Influenzae* non-b**	5	6	1	0	4	4	1	0	2	1	**13**	**11**
HIV	2	0	0	0	10	4	0	0	1	0	**13**	**4**
HTLV1 asyptomatic/unspecified	109	65	1	1	4	4	0	0	0	0	**114**	**70**
Influenza	13	21	0	0	16	31	6	4	5	5	**40**	**61**
Legionellosis	2	2	1	0	0	1	0	0	0	0	**3**	**3**
Leprosy	0	1	0	0	1	1	0	1	0	0	**1**	**3**
Leptospirosis	0	0	0	0	2	4	0	0	0	1	**2**	**5**
Malaria	4	0	0	1	58	40	1	4	3	2	**66**	**47**
Melioidosis	1	0	1	0	21	33	1	0	3	2	**27**	**35**
Meningococcal infection	2	7	0	1	2	2	1	1	1	0	**6**	**11**
Mumps	1	2	0	0	3	5	3	0	0	0	**7**	**7**
MVE	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Non TB Mycobacteria	2	4	0	0	2	4	1	0	0	0	**5**	**8**
Pertussis	39	23	1	1	42	49	12	4	1	15	**95**	**92**
Pneumococcal disease	30	39	1	4	20	22	1	4	4	2	**56**	**71**
Q Fever	3	2	0	0	1	0	0	0	0	0	**4**	**2**
Rheumatic Fever	17	20	0	0	13	18	5	3	9	6	**44**	**47**
Ross River Virus	12	5	4	0	223	165	20	16	23	23	**282**	**209**
Rotavirus	95	82	4	2	390	111	46	30	65	36	**600**	**261**
Salmonellosis	90	62	12	11	219	219	26	34	61	69	**408**	**395**
Shigellosis	62	142	10	4	29	18	16	11	10	22	**127**	**197**
STEC/VTEC	2	0	0	0	0	0	0	0	0	0	**2**	**0**
Syphilis	179	102	8	7	21	51	29	23	32	47	**269**	**230**
Syphilis congenital	5	4	1	0	2	1	0	0	0	0	**8**	**5**
Trichomoniasis	487	387	34	20	417	198	279	158	215	68	**1,432**	**831**
Tuberculosis	4	4	1	0	25	15	2	6	3	2	**35**	**27**
Typhoid	1	0	0	0	2	0	0	0	0	0	**3**	**0**
Typhus	0	1	0	0	0	0	0	0	0	0	**0**	**1**
Varicella unspecified	2	–	0	–	0	–	0	–	0	–	**2**	–
Vibrio food poisoning	0	0	0	0	2	0	0	0	0	0	**2**	**0**
Yersiniosis	1	0	0	0	1	1	0	0	0	0	**2**	**1**
Zoster	11	–	1	–	54	–	5	–	9	–	**80**	–
Total	**3,479**	**3,137**	**172**	**143**	**3,632**	**2,673**	**961**	**722**	**971**	**740**	**9,215**	**1,415**

Note: chickenpox, varicella unspecified and zoster were not notifiable in 2005

Ratio of the number of notifications in 2006 to the mean of the previous 4 years: selected diseases



Ratio of the number of notifications in 2006 to the mean of the previous 4 years: sexually transmitted diseases



Comments on NT disease notification graphs p 35

Chlamydia

The increase in 2006 was due to increased notifications in both Aboriginal and non-Aboriginal populations and mainly among those aged 15-24 years. As there is no evidence that the number of tests had increased, the increase was most likely a true increase in incidence.

Trichomoniasis

The increase in 2006 was mainly due to increased use of convenient nucleic acid testing and more consistent notification practice by the pathology laboratories, although a true increase in incidence could not be ruled out.

HTLV1

The majority of notifications came from Central Australia where high prevalence rates are recognised. The increase was most likely due to increased testing.

Adverse events following immunisation

The immunisation schedule changes in November 2005 saw the introduction of IPV containing vaccines, varicella vaccine for all infants and hepatitis A vaccine for all Indigenous infants.

The increase in adverse events following immunisation (AEFIs) can not clearly be related to these new vaccines however a large proportion of reported AEFIs of limb swelling occurred in people who had received IPV containing vaccines, primarily at 4 years of age (DTPa-IPV). Product information states that erythema is very common following vaccination with IPV containing vaccines (33%) and there is also an increased risk of more extensive local adverse events after booster doses of DTPa and DTPa-combination vaccines.

Extensive limb swelling was also reported in 11 instances where Pneumovax was administered (this has been reported following revaccination with Pneumovax in the past).

There were 6 reported adverse events following administration of BCG vaccine in 2006. Addtional education about administration of this vaccine has been encouraged throughout the year. Administration error was not clearly defined as the cause of AEFIs in each instance.

Meningococcal disease

There were only 6 cases of meningococcal disease in 2006 compared with a 5 year mean of 11.2. This comes 3 years after the implementation of a vaccination program for Meningococcal C Disease, however, given that the Northern Territory had on average about 1 case per year caused by serogroup C, it is unlikely that the program is responsible for this fall in cases.

Q fever

In 2006 there were 4 cases of Q fever compared to a mean of 1.4 per year for the previous 5 years. This continues the upward trend of Q fever cases since the first case was identified in 2002. While this may be a reflection of increased testing and improved diagnosis it is more likely to represent a true increase.

BFV

There was a marked increase in Barmah Forest virus cases in 2006, with 130 cases being 4.4 times the 5 year mean. This number is more than twice the previous highest number in a calendar year (51 in 2005). The increase was noted right across the NT including in Central Australia, but was highest in Darwin. See comments from the Medical Entomology Branch in the *Northern Territory Disease Control Bulletin*, September 2006, p 31.

Vaccination coverage for children aged 12 <15 months at 31 December 2006

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% Fully vaccinated
Darwin	274	94.53	94.53	97.08	97.45	94.16
Winnellie PO Bag	87	93.10	93.10	97.70	98.85	91.95
Palm/Rural	200	91.50	91.50	96.50	96.00	91.50
Katherine	90	93.33	93.33	95.56	96.67	92.22
Barkly	29	93.10	93.10	96.55	96.55	93.10
Alice Springs	135	91.11	91.11	96.30	94.81	91.11
Alice Springs PO Bag	48	89.58	89.58	91.67	93.75	87.50
East Arnhem	46	95.65	95.65	95.65	97.83	93.48
NT	909	92.85	92.85	96.37	96.59	92.30
NT Indigenous	366	90.16	90.16	95.90	95.63	89.89
NT Non-Indigenous	543	94.66	94.66	96.69	97.24	93.92
Australia Indigenous	2,748	84.10	84.10	92.61	92.90	83.19
AustralianNon Ind.	66,243	92.37	92.27	94.93	94.81	91.52
Australian Total	68,991	92.04	91.95	94.84	94.74	91.18

Vaccination coverage for children aged 72 <75 months at 31 December 2006

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% MMR	% Fully vaccinated
Darwin	238	94.96	94.96	92.44	96.22	94.54	91.60
Winnellie PO Bag	87	98.85	98.85	97.70	98.85	98.85	97.70
Palm/Rural	190	95.79	95.26	93.68	96.84	94.21	92.63
Katherine	99	97.98	97.98	97.98	98.99	97.98	97.98
Barkly	18	100.00	100.00	100.00	100.00	100.00	100.00
Alice Springs	111	96.40	96.40	96.40	97.30	96.40	95.50
Alice Springs PO Bag	50	98.00	98.00	98.00	98.00	98.00	98.00
East Arnhem	51	100.00	98.04	96.08	100.00	100.00	94.12
NT	844	96.68	96.45	95.14	97.51	96.21	94.43
NT Indigenous	338	96.75	96.45	94.97	98.22	97.63	94.67
NT Non-Indigenous	506	96.64	96.44	95.26	97.04	95.26	94.27
Australian Indigenous	3,028	95.57	95.41	93.89	98.05	94.65	91.74
Australia Non Ind.	63,240	95.17	95.07	93.91	95.74	93.92	92.42
Australian Total	66,268	95.19	95.09	93.91	95.85	93.95	92.39

Vaccination coverage for children aged 24 <27 months at 31 December 2006

Region	Number in District	% DTP	% Polio	% MMR	% Fully vaccinated
Darwin	229	83.41	83.41	83.84	82.10
Winnellie PO Bag	83	100.00	100.00	100.00	100.00
Palm/Rural	189	88.36	88.36	88.89	88.36
Katherine	78	88.46	87.18	85.90	85.90
Barkly	14	85.71	92.86	85.71	85.71
Alice Springs	116	86.21	86.21	86.21	85.34
Alice Springs PO Bag	57	96.49	96.49	96.49	96.49
East Arnhem	49	95.92	95.92	95.92	95.92
NT	815	88.83	88.83	88.83	88.10
NT Indigenous	303	93.07	92.74	93.07	92.08
NT Non-Indigenous	512	86.33	86.52	86.33	85.74
Australia Indigenous	2,367	87.66	87.92	88.13	86.78
Australia Non Indigenous	65,430	88.88	88.86	88.84	88.04
Australia Total	67,797	88.84	88.83	88.82	87.99

Vaccination Coverage 31 Dec 2006

Vaccination coverage rates for NT children by regions based on Medicare address postcode as estimated by the Australian Childhood Immunisation Register are shown on page 37.

Background information to interpret coverage

Winnellie PO Bag is postcode 0822, which includes most Darwin Rural District communities, some East Arnhem District communities and some people who live in the Darwin 'rural area' who collect mail from the Virginia store or Bees Creek. Alice Springs PO Bag is postcode 0872, which includes Alice Springs District, Nganampa and Ngaanyatjarra communities.

The cohort of children assessed at 12-<15 months of age on 31 December 2006 were born between 01/07/2005 and 30/09/2005 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 2 doses of PRP-OMP Hib or 3 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) (latest doses due at 6 months of age). All vaccinations must have been administered by 12 months of age.

The cohort of children assessed at 24-<27 months of age on 31 Dec 2006 were born between 01/07/2004 and 30/09/2004 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 3 doses of PRP-OMP Hib or 4 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) and 1 dose of measles, mumps, rubella vaccine (latest doses due at 12 months of age). All vaccinations must have been administered by 24 months of age.

The cohort of children assessed at 72-<75 months of age on 31 Dec 2006 were born between 01/07/2000 and 30/09/2000 inclusive. To be considered fully vaccinated, these children must have received 5 valid doses of vaccines containing diphtheria, tetanus, pertussis antigens, 4 doses of poliomyelitis vaccine and 2 valid doses of measles, mumps, rubella vaccine (latest doses due at 4 years of age). All vaccinations must have been administered by 72 months (6 years) of age.

Interpretation

Immunisation coverage in NT children was above the national average for all cohorts. NT Indigenous children were slightly lower then the national average for the 12-<15 month cohort, almost equal for the 24-<27 month cohort and over 4% higher for the 6 year olds.

Immunisation coverage for non-Indigenous NT children at 6 years of age (85.74%) remains lower than for the younger cohorts, and immunisation coverage at this age is a concern across Australia.

It is highly commendable that NT immunisation providers have achieved an immunisation coverage higher than the national average across all cohorts in this quarter. If you read carefully you would note that Barkly had 100% coverage for the 72-<75 month cohort as of December 2006. Congratulations.

Disease Control staff updates

Darwin

TB/Leprosy

Dr Madhumati Chatterji, a Public Health Physician has joined us as the Medical Officer for Illegal Foreign Fisher (IFF), TB and Refugee screening. Madhu brings with her wide experience from her professional days in Tropical Medicine in India and more recently from the National Cervical Screening Program at the Ministry of Health in New Zealand. Other changes in the Darwin team are **Sarah McCarthy** commencing as administration officer, **Dr Natalie Gray** moving to a full time position with CDC now that she has completed work updating the Women's Health Manual. **Meredith Hansen-Knarhoi** moves on to new challenges working in the emergency response team with Merlin, based in London. Meredith with her background in refugee health and emergency response has contributed largely to NT and national health care planning for refugees. **Lyn Kerr** takes on this position in the Darwin team coming most recently from the RDH discharge planning team. **Dr Ros Webby** has returned to CDC as the TB/Leprosy medical officer for her 2nd year of public health training. Last year she was a district medical officer for Minjilang and other remote Darwin communities. Her first baby is due in June and she will be on maternity leave for 6 months. **Lyn Barclay** is providing some short term relief again!

Masters of Applied Epidemiology (MAE)

Congratulations to **Shellee Williams** on successful completion of her MAE. Shellee is currently working part time with CDC on her Salmonella project. **Emily Fearnley** is the new MAE Student at CDC, Darwin. She has just completed her PhD at Flinders University, Adelaide, in the Department of Environmental Health.

Community Paediatrics

Term 1 sees the departure of **Dr Danni Bao** and the commencement of **Dr Andrea McGlade**.

Immunisation

Dr Julie Graham, moves from her position as TB/Leprosy Medical Officer to being section head for the Immunisation Program. She leads a growing team with **Amy Ryan** employed to coordinate the HPV Immunisation program for the NT with additional staff to be employed in the near future to facilitate the rural program and assist with subsequent doses in the urban program.

Sexual health & Blood Borne Viruses (SH&BBV)

Shannon Grant, and **Jacqui McCourt** (for 6 months only) have moved on to new positions with **Anne Hanning** filling the administration support for the SH&BBV program.

Anne Davis is back from extended maternity leave to the Darwin SH&BBV Remote position. **Maggi Richardson** has won the Clinic 34 Manager position for Darwin with Carole Duke moving to a new position as syphilis coordinator. **Dr Anuja Kulatunga** now provides 3 sessions a week for the next 6 months for Clinic 34.

New staff to join the program are **Gerri Grady**, Project Manager for Implementation of Guidelines regarding Sexual Health Issues in Children and Young People, **Natasha Tatipata** Female AHW Darwin Urban and sessional doctors (one session a month) **Josh Davis** and **Steven Tong**.

Barkly

Molly Cobden's resignation from Barkly CDC is with great regret as she brought great enthusiasm to her work.

Alice springs

Staff changes in Alice Springs include **Laura Havard,** administration support for CDC TB/ surveillance/ immunisation and additional duties for **Kelly Phillips** with the Rheumatic Heart Disease data dictionary.

Sexual Health & Blood Borne Viruses

Dr Kieran Mutimer is providing locum medical support for Clinic 34. This is for 1 week per month while recruitment is in progress. **Emma Tilley** (RN) and **Rosalie Riley** (Aboriginal liaison) are working on a chlamydia targeted grants project, with the Emergency Department to improve screening and treatment for STIs.

Other staff commencing are **Jez Hann** as Clinic 34 Co-ordinator, **Sonia Lyon** as Tristate nursing officer, sexual health and **Dorian Dent** as Sexual Health Educator for Alice Springs, Sexual Health

This period has seen the departure of **Dr Ahmed Latif**, **Dr Kath Fethers**, **Nicole McIntosh** and **Latoyah Coombe.**

Environmental Health

Environmental Health Officers (EHOs) **Aaron Clifford** and **Russell Spargo** have joined the team in Central Australia.

Returning staff are **Greer Ashby** (East Arnhem) and **Michael Kinnaird.** Both are here for a few months as contract EHOs.

Medical Entomology

Alan Niscioli has swapped plants for insects moving from a CSIRO Technical Officer pest control position to Technical Officer with the vector control team.

The Groote team

With the recruitment process complete, the Groote Eylandt Dengue Mosquito Eradication team has finally come together as a group. Team members include the Project Manager, **Myron Kulbac** who has a background in pathology and team leader **Geoff Cole** who has extensive experience with AQIS. **Brett Devitt, Bruce Hitchins** and **Kevin Horig** complete the technical team with considerable experience with various eradication programs. **Samantha Gualandi** provides administration support and comes to us with prior experience gained at Charles Darwin University.

The new field team travels to Groote Eylandt in mid March to continue with the eradication program. Myron would like to thank all DHCS staff who volunteered to fill the gaps during the early days of the program while the recruitment process was under way.

Groote team from left to right are: Kevin Horig, Geoff Cole, Myron Kulbac, Samantha Gualandi, Bruce Hitchins, Brett Devitt.