Antenatal Screening for HIV

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Introduction

This paper examines some of the issues surrounding the practice of antenatal screening for HIV. It is intended to be a discussion paper and hopefully will provoke informed debate on what has been a controversial issue in the Northern Territory.

Why do we perform antenatal screening? Is it to protect the attending midwife or the foetus? The obstetrician or the mother? Is “protection” a valid concept anyway, for what change in work practice will follow the detection of a positive test? Are we testing for epidemiological reasons i.e. for the interests of Public Health rather than of the individual? Are we obtaining informed consent for the test (or indeed for any of the antenatal serological testing performed)?

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Background

In the mid 1980s universal screening for HIV was added to the antenatal serological testing performed in the Northern Territory. At that stage little was known of the prevalence of the disease in Aboriginal and non-Aboriginal heterosexual communities. Antenatal screening of pregnant women who are, by definition, sexually active, provided firm evidence that the disease had not entered the heterosexual population. It became apparent that the prevalence of the disease was so low that there was no cost benefit in screening for HIV. Compare this with Hepatitis B or syphilis, where the prevalence is relatively high in the Aboriginal population and there are obvious benefits in screening. The implications of pre- and perinatal infection with these agents
are serious, but safe and effective interventions are available. Interventions for HIV were not available in 1988. However, some progress has been made since then: the introduction of zidovudine and routine PCP prophylaxis has prolonged life expectancy in patients with AIDS. The probability of vertical transmission from mother to child is now well defined and meaningful antenatal counselling is possible.

Why screen antenatal patients?

The following reasons have been cited as rationale for antenatal screening:

(i) To alert health care workers to the risk of transmission.

Testing is widely believed to be the cornerstone strategy for the prevention of occupational transmission of HIV. Although this has been shown to be untrue, it remains a divisive issue. Research at San Francisco General Hospital has demonstrated that the risk of occupational exposure is not decreased by knowing the HIV status of a patient. Other viruses are important to consider too: hepatitis C, HTLV-1, HTLV-2 and the putative agent of Creutzfeldt-Jakob disease are all transmissible by blood (there are no serological tests available for the latter).

Prevention is dependent upon the institution of Universal Precautions or Body Substance Isolation procedures: rates of needlestick injury fall in hospitals that adopt rigorous safe work practices. In 1980 HIV was unknown as a blood borne pathogen. It would be foolish to suggest that other agents will not appear in the future.

(ii) To detect HIV infection in individual mothers.

The potential benefit of routine screening is dependent upon the underlying prevalence of the disease. In New York City the prevalence of infection is frighteningly high and so screening will detect a number of infected individuals within a short period of time. However, an unlinked antenatal screen performed in Sydney in 1989 failed to reveal a single case of HIV infection. The positive predictive value of a test in this situation is therefore very low.

One patient has been detected in the NT since screening started, making the positive predictive value of the test similarly low. In addition, there is anecdotal evidence that the rate of indeterminate tests in the NT is higher than in southern populations. This would mean extra follow-up and the potential for unnecessary patient anxiety.

(iii) To detect HIV infection in the community.

We know that the prevalence of HIV infection in the NT is very low. This fact is based upon data from the blood bank, individual testing of patients by hospital based and private practitioners (especially individuals presenting with another STD) and from the antenatal screening that has been performed in the past. The low prevalence of HIV infection in Aboriginal populations is mainly inferred from the antenatal screening data.

A major concern for the NT is the expected rapid spread of infection once HIV is established in the Aboriginal community. Widespread screening of the Aboriginal population is difficult to perform and is often met with resistance for many understandable historical reasons. However, without an adequate understanding of the prevalence of the disease it is not possible to provide appropriate preventive and treatment services.

Antenatal testing could be an appropriate sentinel surveillance system. This screening could be anonymous and de-linked or could remain part of the routine antenatal screening offered to women.

Routine or Compulsory

There appears to be a confusion of terminology in this area. There is a major distinction to be made between routine testing and compulsory testing.
Routine testing means that HIV testing is offered to every woman presenting for antenatal care. The obstetric personnel make an assessment of the woman’s risk and provide her with the appropriate information so that she can make an informed decision about HIV (and other serological) testing.

Compulsory testing implies that the woman has no choice about the testing and that blood taken for other reasons is tested for HIV with or without the woman’s knowledge or consent. There are very few instances where compulsory testing is ever justified.

Informed Consent

Since the commencement of the AIDS epidemic we have learnt much about consent for serological testing. Very little attention was paid to consent for other important testing (e.g. hepatitis B) and widespread screening without the patients’ knowledge occurred in the 1970s. A perception has arisen that HIV is “special” and an almost religious aura surrounds the practice of testing and pre-test counselling. There is a common belief that HIV test results need to be treated with a reverence that is not due to other tests. However all medical testing should require the patient’s consent and HIV should not be seen as a special case.

Unfortunately, it is possible to become paralysed by difficulties experienced in obtaining informed consent prior to testing. It is important not to disadvantage an individual or group because informed consent might be “too hard to get” or “not worth the trouble”. The term “pre-test counselling” is also a major obstacle and erroneously conjures images of a prolonged, in-depth session that is irrelevant in the context of an HIV test.

Summary

1. The value of antenatal screening is dependent on the prevalence of HIV in the particular population being screened. The positive predictive value of an HIV test in low prevalence areas means that screening as a means of case-finding is unlikely to be cost-effective.

2. Antenatal screening for HIV will not necessarily protect staff from occupational exposure. The institution of safe work practices will be far more effective in this area.

3. Antenatal testing may be routine but is never compulsory; informed consent must always be obtained prior to testing.

4. Antenatal screening of Aboriginal populations provides an important sentinel surveillance of HIV in groups who may not otherwise be tested. It will be an early indicator of the entry of HIV into a community.

5. Ongoing Community consultation is essential to ensure appropriate testing procedures are developed.

References

Australian Encephalitis in the NT

Jim Burrow, Royal Darwin Hospital

Australian Encephalitis (AE) is an arboviral (i.e., mosquito borne) disease caused predominantly by Murray Valley Encephalitis virus and occasionally by Kunjin virus. The disease was recognised first as an illness occurring as epidemics Australia wide, but chiefly centred about the Murray-Darling river system. The last major epidemic was in 1974; 58 people were affected, including five from the Northern Territory.

Since the 1950's evidence has accumulated indicating that in contrast to the situation in southern Australia, AE is endemic in the Top End of the Northern Territory and the Kimberley region of Western Australia. Small outbreaks of disease occurring every couple of years are seen in these regions; since 1974 there have been 36 documented AE cases, including 11 this year. The disease has been reported throughout the Top End of the Northern Territory (Lajamanu, Katherine, Beswick, Belyuen, South Alligator River, Maningrida, Groote Eylandt); all areas north of Tennant Creek are risk areas for acquiring AE.

AE is seasonal, occurring only in the first half of the year, especially in the months March to May. Young children (under 4 years) seem particularly vulnerable but adults of all ages have been reported. Aboriginals are over-represented; this probably reflects exposure to the vector rather than increased susceptibility. In children the usual presentation is high fever (40°C) with seizures. In contrast seizures are unusual in adults; more commonly the presentation is fever, headache and confusion. Clinical pointers to AE are tremor, cranial nerve palsy and an anterior horn cell syndrome resembling acute poliomyelitis. CT scan is normal early in the illness, the EEG shows diffuse slow wave activity and the CSF typically shows an elevated white cell count (R20-450) usually monocytic but not invariably.

Treatment is purely supportive with special attention to respiratory function as central hypoventilation may occur in an otherwise mildly ill patient. The fever abates over a week; most patients are hospitalised for at least three weeks. The diagnosis is confirmed by a fourfold increase in IgG to MVE between paired sera and in the acute phase of the illness a presumptive diagnosis is made by demonstrating specific IgM to MVE on sera or CSF.

AE is a serious neurological illness with a mortality in hospital cases of 20% (7/36) and another 25% having major intellectual and neurological sequelae. About 40% apparently make a complete recovery; it is difficult to be certain of this as long term cognitive follow-up on the young children affected has not been done.

The viruses of AE are enzootic in a large number of birds and some mammals in northern Australia. The virus is transmitted between animals by the common banded mosquito (Culex annulirostris). The peak time of transmission is at the end of the West Season when the mosquito proliferates to extremely high populations in flood plains and billabongs. This accounts for the seasonal and year to year variation of AE. Man made structures such as sewerage ponds and dams also harbour Cx annulirostris and have been implicated in human disease in several instances. This highlights the importance of good engineering and high standards of maintenance of public works.

As there is no effective treatment for AE, avoidance of mosquito bites is paramount in prevention. The usual measures of long clothing, DEET and netting apply. Extra care should be taken at dusk as this is the preferred feeding times of Cx annulirostris. It is unlikely that a vaccine will be available in the foreseeable future.
The Medical Entomology Branch in the NT
Peter Whelan, Medical Entomology, Darwin

In 1972 the Northern Territory Department of Health established a small medical entomology section to investigate and organise control of insects of medical importance in the Northern Territory, with an emphasis on the mosquito vectors of malaria. The Northern Territory was one of the first States or Territories to set up a unit devoted solely to this purpose.

As a result of the 1974 Australian encephalitis outbreak, the need for research and control of mosquito borne diseases on an Australian-wide basis became apparent. The Commonwealth Department of Health provided financial assistance to the State and Territories in late 1974, under the Australian Encephalitis Control Program. This contributed towards the equipment and operational needs to establish mosquito control programs in Alice Springs, Darwin, Nhulunbuy and Alyangula. The control programs were developed with assistance from the various local councils, corporations or mining companies and the local departmental health surveyors.

From the beginning, with a single entomologist and a part-time tearoom laboratory, the entomology unit has evolved into a distinct branch of the Department of Health with a well equipped laboratory, permanent staff and a comprehensive vector research and control program.

The Northern Territory has a range of geographic areas, from the tropical monsoonal north to the semi-arid desert areas of Central Australia. In the northern area, the timing of vector surveillance and control operations can be scheduled with some degree of certainty, depending on the arrival and the end of the monsoon season and tidal predictions. Vehicle access to many of the areas during the wet season can be very limited posing particular problems. In the semi-arid areas, the timing of surveillance and control operations is variable and dependent on seasonal conditions. After widespread rains, vast areas can be covered with water and become inaccessible. Even within one geographic area in the Northern Territory, differing land forms and swamp systems produce different peak periods of abundance of mosquitoes due to variable vegetation and water characteristics. The differing habitats of the region mean that they require individual assessment for vector prevalence and vector control requirements.

Unlike some of the southern states, the NT has to contend with the threat of the re-introduction of malaria, transmission of arbovirus diseases such as Ross River virus, Barmah Forest virus and Murray Valley Encephalitis virus, as well as the potential re-introduction of Aedes aegypti, the vector for dengue.

These diverse challenges coupled with relatively small resources, have required a somewhat different approach to vector control in other states. The program includes a mosquito borne disease surveillance program, regular mosquito monitoring at major population centres, planning inputs into rural and urban residential, recreational and industrial development, and adult and larval vector control operations at major towns.

For smaller communities, tourist and recreation areas and rural areas, self protection from mosquitoes must continue to be the mainstay of
prevention of mosquito borne disease. To this end, a Territory wide mosquito awareness pro-
gram is maintained through various media outlets, shows and public displays, to raise the level
of public awareness of mosquito borne disease and to encourage self protection and avoidance
of mosquito bites.

The various surveillance programs run by the entomology Branch include:

1. Malaria surveillance.
   Entomological surveillance of every malaria case to determine vector control needs to
   prevent transmission.

2. Dengue surveillance
   2.1 Aedes egg traps around Darwin suburbs to detect imports of exotic Aedes species such as
       Aedes aegypti.

   2.2 Aedes larval surveys of vulnerable points of entry in Darwin such as caravan parks, tyre
       yards, interstate trucking yards and removalists, nurseries, the airport and the port area.

   2.3 Aedes larval surveys between the Queensland border and Katherine every two to three
       years searching every community and station to detect possible importation from Queensland.

2.4 Assistance to the Quarantine authorities on inspection methods of overseas vessels and
rapid identification of recovered larvae.

3. Arbovirus Surveillance
   3.1 Collecting mosquitoes alive and organizing virus isolation to determine where, when and
       what species are carrying various arboviruses.

   3.2 Sentinel chicken surveillance. To detect arbovirus activity in key areas.

   3.3 Arbovirus report scheme. Each arbovirus case is investigated with the assistance of coop-
       erating general practitioners, to determine the data and location of arbovirus transmission.

4. Mosquito monitoring
   Weekly monitoring of mosquito numbers at all major towns and organizing mosquito con-
   trol.

5. Planning Surveillance
   Review of all relevant planning and develop-
   ment proposals to advise and prevent further mosquito breeding and mosquito borne disease.

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**Pertussis in Central Australia**

*Rosie Brennan, CDC, Alice Springs*

A clinical case of pertussis in a 5 year old non-
Aboriginal boy from a remote NT cattle station
was notified on March 5.

In the previous month he holidayed in Queens-
land, then in NSW, where he became ill on
Feb12. From Feb 22-26, he attended a gathering
of School of the Air pupils in Alice Springs. He
saw a GP on Feb 26 for a dry cough and flu-like
symptoms.

His 8 year old sister developed similar symptoms
the same time, but her symptoms were less
severe and appeared on March 5.

The five children who had spent the week in
February in the same classroom with the index
were identified as close contacts and all accepted
a course of erythromycin prophylaxis. A press
release was issued to promote pertussis immu-
nisation.

On March 15 the polymerase chain reaction on
the nasopharyngeal aspirate was positive for *B.
pertussis*.

This was the first case of pertussis notified in
Alice Springs since 1990. There was potential
for the infection to spread widely throughout the
region. Preventive action was initiated quickly with the cooperation of all parents, the school, rural health staff and the RFDS.

It is likely that the infant acquired the infection through contact with epidemic pertussis in Adelaide.

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**Measles Outbreak in Alice Springs**

*Rosie Brennan, CDC, Alice Springs*


Two cases acquired the infection in Port Augusta. South Australia subsequently five cases were infected in Alice Springs township and four at Alice Springs Hospital.

Six cases had a positive measles IgM test. Of the 5 clinical cases who were not serologically tested, 4 had close contact with a confirmed measles case and one had no known contact.

Four cases had missed their age appropriate measles immunisation and 2 cases had MMV (one in 1985 and the other in 1988). MMR is given to Aboriginal infants at 9 months of age in the NT.

Seven generations of the epidemic were identified.

Four cases were hospitalised for measles.

Factors which contributed to the outbreak included:

1. Unvaccinated children.
2. Delayed diagnoses of prodromal and overt measles.
3. Delay in isolating suspected cases.
4. Inadequate use of available measles control guidelines.
5. Failure or delay giving post-exposure prophylaxis.
6. Vaccine failure in 2 cases.
7. Missed opportunities to immunise.

Measures are being implemented to increase orientation of new health professionals to communicable disease control, promote opportunistic immunisation and to increase awareness of measles control procedures.

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**Darwin's Mystery Virus**

*Tiiina Voolmann, CDC, Darwin*

A seasonal virus, causing symptoms of headache, runny nose, cough, vomiting in children, and nausea in adults, began circulating in the Darwin area at Easter and was still active at the end of May.

Three general practices collaborated with CDC by collecting 23 throat swabs for viral culture from adults and children. The virus responsible for this seasonal outbreak was probably an adenovirus or echovirus. Some members of these virus families are difficult to isolate or grow and this seasonal virus was one of those.

We thank everyone for their help in this investigation. However, our mystery virus remains a mystery!
Malaria and the NT

Tiina Voolmann, CDC, Darwin

Malaria Surveillance and the Arafura Sports Festival

The Arafura Sports Festival brought to Darwin great excitement and sport but also the risk of introducing malaria into the NT. Several hundred competitors and associates arrived from high risk malarious countries. It is not realistic to test or treat each individual as they step off the plane. We could only educate visitors of our concerns for introducing malaria into the NT and entreat them to seek medical help if they developed a fever.

CDC instigated active surveillance and an education campaign for the duration of the festival. The festival ended as a huge success and no cases of malaria were reported. A couple of false alarms occurred during the festival week when two cases of malaria were reported. One infection occurred in an overseas student and the second in a tourist.

Malarial Prophylaxis for Overseas Students in the Top End

Active surveillance of secondary students coming to study in the NT from malarious countries was instigated in 1991. Overseas students numbers from high risk malarious areas are gradually increasing in both the secondary and tertiary education systems (Table).

Thus, the ongoing surveillance is being expanded to include university students as well. Previously students from malarious areas were screened for malaria on initial entry into Australia, and malaria prophylaxis was provided for visits home during school breaks. Since it has become apparent that compliance with prophylaxis is poor, all students will be screened after every entry and re-entry into Australia.

Students have been confused when differing prophylactic regimens have been prescribed by different doctors for the same country. CDC is therefore preparing specific recommendations for students. They will be forwarded to all local doctors and will also be given to each student when attending a doctor. We will develop education packages to improve understanding of why we have screening and why we recommend prophylaxis.

We must remain vigilant to the risk of introducing malaria into the NT.

| NUMBER OF OVERSEAS STUDENTS IN THE NT FROM HIGH RISK MALARIOUS COUNTRIES |
|-----------------------------|-------|-------|
| Secondary student           | >17*  | 31    | 50    |
| University student          | 14    | 31    | 30    |
| No. of cases with malaria   | 5     | 3     | 6     |
| *incomplete data            |       |       |       |
Ross River Virus - Are We Over Diagnosing Cases in the NT by Not Testing a Convalescent Specimen of Serum?
Tiina Voolmann, CDC, Darwin


These findings clearly illustrate that there is still a need for "acute" and "convalescent" sera to be collected to confirm any diagnosis based on serological testing.

### Results of Specimens Tested by Western Diagnostic Pathology

<table>
<thead>
<tr>
<th>Acute serum: IgM +ve</th>
<th>Convalescent serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>171</td>
<td></td>
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</tbody>
</table>

- **IgG**
  - **POSITIVE**
    - Diagnosis of RRV infection confirmed: 58
  - Not RRV infection
  - **NEGATIVE**
    - Acute IgM result was a false positive: 48

- Definite diagnosis unknown

* 6 specimens were not tested

Virus (RRV) IgM testing could result in an erroneous diagnosis of the infection.

From the Figure, it can be seen that in the 112 cases where a convalescent serum was available, 48 (45%) had not developed IgG antibodies. This meant that there was no serological evidence of RRV infection and that the initial positive IgM test results were false positive results.

Thus, the authors concluded that these 48 cases could have been given a wrong diagnosis if the convalescent serum sample had not been tested. For our notifiable disease data, we have been accepting that the presence of IgM antibodies in one serum specimen indicates a recent infection with Ross River virus. It would appear that up to 45% of these tests may represent false positive results. Possible reasons for the false positive results include current infection with other viruses, e.g. Barmah Forest or rubella, or inherent technical difficulties with IgM testing.

We need to redefine what we mean by confirmed case of recent RRV infection for clinical purposes and for informing the patient of the correct diagnosis. A panel of Australian arbovirus experts have defined the term of confirmed arbovirus infection (including RRV). A fourfold rise or fall in antibody titre between paired sera is essential to confirm the diagnosis. The ‘acute’ serum needs to be collected as early as possible within the first two weeks of illness, and the ‘convalescent’ serum from 10 days after collecting the acute serum, up to 28 days from the onset of illness.

A positive IgM result for RRV in a single specimen of serum does not confirm the diagnosis. A second convalescent serum specimen is necessary to identify any significant change in titre, or development of IgG antibodies. We recommend that a second convalescent specimen be collected in all patients with symptoms and signs consistent with a Ross River Virus or other arbovirus infection.