Introduction

HIV infection refers to infection with the human immunodeficiency virus that results in a broad spectrum of disease associated with disturbance of the immune system. Acquired Immunodeficiency Syndrome (AIDS) represents the severe end of the spectrum.

The risk of mother-to-child transmission (MTCT), also called vertical transmission, varies to a great extent on the setting in which the mother is cared for. The natural history of MTCT shows transmission rates between 30 - 40% in developing / low income countries and up to 25% in developed / industrialised countries.\(^1\) Most MTCT occurs close to or during childbirth.\(^2,3\) MTCT rates can be reduced to 1 - 2% using a combined strategy of antenatal, intrapartum and neonatal highly active anti - antiretroviral therapy (HAART), minimising the baby’s exposure to maternal blood and secretions, elective caesarean section and not breast feeding.\(^4-11\) In industrialised countries, combination HAART is the standard of care primarily to prevent disease progression and also has the added benefit of decreasing MTCT.\(^6,11\)

Incidence and Risk factors

Incidence:

At the end of 2002, there was an estimated 42 million people living with HIV/AIDS worldwide and of these 19.2 million are women and 3.2 million are children < 15 years.\(^12\) In Australia, over a 20 year period (1982-2001) there have been reported 255 infants perinatally exposed to HIV infection.\(^13\) During 5 year period of 1998-2001, there were 89 infants exposed and of these, 6 (7%) became infected. All these infants were born to mothers who were diagnosed postnatally, no infant whose mother was diagnosed antenatally became infected.\(^13\)

Risk factors for neonatal infection

- **Antenatal:**\(^12,14\) Maternal state of immunity (HIV infection v AIDS), high maternal viral load. High risk groups include: intravenous drug use, haemophilia or partner with haemophilia, partner of bisexual males.

- **Intrapartum:**\(^14-18\) Prolonged duration of ruptured membranes (>4h), chorioamnionitis, mode of delivery, instrumental delivery, episiotomy, scalp electrodes, first-born twin, prematurity.

- **Neonatal period:**\(^7,8\) Breast feeding

Consequences

During the pregnancy all babies will passively acquire the maternal HIV antibody across the placenta and carry this maternal HIV antibody for 18-24 months.\(^19\) The majority of babies will not be infected.

Management:
This is aimed at preventing mother to child transmission.

**Mother** (see labour ward guideline for further details)

- **Antenatal:**
  - A HIV team or immunologist should be involved in the mother's care in conjunction with an obstetric team. Decisions relating to HAART will be made on the basis of safety to mother and fetus, as well as maternal viral load.

- **Intrapartum:**
  - For the delivery Zidovudine infusion 2mg/kg loading dose over one hour, followed by a continuous infusion at 1mg/kg/hr.  
  - Mode of delivery depends on maternal viral load and immune suppression.
  - Elective caesarean section before the onset of labour may reduce the risk of MTCT compared with vaginal delivery.  
  - If maternal viral load is very low (<1000 c/ml) and she is on antiretroviral therapy, then an elective LSCS may not confer any added benefit to reducing MTCT over a vaginal delivery.  
  - Avoidance of invasive obstetric procedures such as instrumental deliveries, artificial rupture of membranes, use of fetal scalp electrodes and fetal blood sampling may be of benefit.  
  - Placenta: If it is considered necessary for the placenta to be examined, discussion with the pathologist is required prior to sending the placenta to pathology.

**Baby**

- **Antenatal:**
  - Neonatal consultants, Newborn Care and pharmacist to be notified of estimated delivery date of infant.
  - Pharmacy should have Zidovudine syrup available in the newborn care nursery around the time of delivery. Liaise with RPAH Newborn Care pharmacist, page no: 81054.

- **Following delivery:**
  - Neonatal consultant to be notified.
  - If baby is born Monday Friday: contact Ms Kidest Nadew, Clinical Nurse Consultant from the Paediatric HIV Team at Sydney Childrens Hospital (SCH) on 93821654 or via SCH switchboard 9382111 page no. 40327.
  - If baby is born on the weekend or after hours: contact SCH switch and ask for Professor John Ziegler (paediatric immunologist), pager 44115.
  - Cord blood needs to be taken to determine the HIV status of the infant (see Diagnosis.)
  - The infant is to remain with mother unless medically indicated for admission to newborn care.
  - Universal precautions should be used for all infants at all times.
  - The infant should be washed as soon as is practical to remove all maternal secretions.
  - Intramuscular Vitamin K should be given once the baby is bathed.
  - Antiretroviral therapy: This will be guided by the paediatric HIV team and is based on the maternal antenatal management as well as the maternal viral load.

  - **Zidovudine (AZT)** is to be started within 6 -12 hours after birth and continued until aged 6 weeks at which time it may be discontinued if all results are negative. This regimen is based on data from the AIDS Clinical Trials Group (ACTG) 076 that demonstrated a significant reduction in MTCT when Zidovudine was given in combination to the mother and baby.  

  **Zidovudine dose:**
  - **Oral:** 2mg/kg per dose every six hours
  - **Intravenous:** 1.5mg/kg every six hours

- In some circumstances a baby will be prescribed Nevirapine. The dose is based on the HIVNET 012 guideline.
**Nevirapine dose:** 2mg /kg oral, once only dose, to be started within 72h after birth.

- If a mother is on combination therapy that includes Lamivudine (3TC) the decision to commence this for baby should be made by the HIV team along with the neonatologist. There has been case reports of mitochondrial disorders in children, as well as the emergence of viral resistance.

**Lamivudine dose:** 2mg/kg/dose every 12 hours orally

- Feeding: Infants should have formula milk feed. Breast feeding is not recommended if a mother is HIV positive, as there is an increased risk of HIV transmission to the baby.
- Newborn screening test: This should be performed as usual on day 3/4. A biohazard sticker should be placed on the card and when the blood is dry should be placed in an enveloped and labelled.
- Prophylaxis against *Pneumocystis carinii* pneumonia is recommended for all infants born to HIV infected mothers. Cotrimoxazole (Bactrim) is to commence at 6 weeks of age and stopped only if subsequent testing confirms absence of HIV infection.

**Cotrimoxazole**
- dose: 5mg/kg/day orally for 3 days/week (Mon, Wed, Fri)
- or
- 2.5mg/kg/dose every 12 hours for 3 days/week (Mon, Wed, Fri).

- Immunisations: Routine immunisations schedules should be followed. No live vaccinations should be given until it is confirmed the infant is HIV negative.
- Education: It is essential that parents and caregivers have an understanding of the modes of transmission of HIV. Information should be given regarding methods of cleaning blood / body secretions and soiled clothing to prevent cross infection to other family members.
- Follow up: It is essential that the infant and family have close follow up for medical, social and psychological supports. Referral should be made to:

  *The Clinical Nurse Consultant: Ms Kidest Nadew*
  *The Paediatrics AIDS Unit, Sydney Childrens Hospital, Randwick. NSW. Ph: 9382 1654.*

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**Diagnosis: Blood samples for the neonate**

- Informed parental consent is required to test for the HIV virus.
- For diagnosis of HIV infection in babies, the virus needs to be detected first and later quantified. HIV antibody testing is useless in babies since they all have the maternally derived HIV Ab.

**Demonstrate viral DNA:** Polymerase chain reaction, (PCR) is used to detect proviral HIV DNA infection in babies. It has a joint sensitivity and specificity between 93 - 95%, however, neonates have a lower sensitivity and specificity than infants (93% v 98%). An initial positive PCR viral test indicates possible HIV infection and further testing is repeated as soon as possible for confirmation. A negative initial PCR especially in the neonatal period must also be repeated for confirmation (see Diagnosis).

**Viral load:** After infection with HIV is confirmed, the viral load is quantified and HIV genotype is determined.

**Notification to the NSW Department of Health is mandatory if a baby is diagnosed with HIV infection.**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Test</th>
<th>Volume</th>
<th>Tube</th>
<th>Hospital</th>
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<tbody>
<tr>
<td>HIV PCR</td>
<td></td>
<td>1 - 5 ml</td>
<td>EDTA (purple top)</td>
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Cord blood

<table>
<thead>
<tr>
<th>HIV research</th>
<th>20 ml</th>
<th>Lithium heparin (green top)</th>
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<tbody>
<tr>
<td>HIV genotype</td>
<td>5ml</td>
<td>EDTA</td>
<td>RPAH</td>
</tr>
<tr>
<td>HIV PCR</td>
<td>5ml</td>
<td>EDTA</td>
<td></td>
</tr>
<tr>
<td>HIV antibodies</td>
<td>5-10ml</td>
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Baby: day 1

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<tbody>
<tr>
<td>HIV serology #</td>
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<table>
<thead>
<tr>
<th>FBC</th>
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<th>RPAH</th>
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Baby: day 7*

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<tr>
<td>HIV serology #</td>
<td>1 ml</td>
<td></td>
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</table>

*Please do not take on weekend, but ensure blood is taken on the next working day. Contact the Paediatric HIV Team when you have taken this blood and arrangements will be made for collection.

# Blood for research: Consent should be obtained antenatally if possible by the paediatric HIV team.

Cord blood:

- A total volume required is 45mls if possible.
- The midwives will usually collect the cord blood. Paediatric staff may be asked to assist.
- Please be very careful not to contaminate the cord blood with maternal fluids on the exterior of the cord and wipe the cord clean before taking samples.
- Blood samples must remain at room temperature at all times
- Blood samples should be sent to the laboratories within 24 hours of collection.
- For SCH: The forms and the tubes for this are in the Labour Ward Sluice Room packaged in a styrofoam container and labelled Specimens for Sydney Children's Hospital - Paediatric Research Laboratory. The forms have the required tests already written on them, however, the date and time need to be completed. Please put this sheet around the box when all specimens have been collected and are inside it.

From baby:

- FBC should be taken as a baseline prior to starting Zidovudine treatment. A fall in haemoglobin is the commonest side effect of Zidovudine. ²
- Further PCR testing is done at 6 and 12 weeks and at 6 months to confirm HIV infection status.

Details for transport to RPAH Immunology Laboratory (ph: 9515 8731)

- These blood samples go to Immunology through the normal courier system.
- If there are any questions regarding cord blood collection, please contact Dr Roger Garsia, immunologist, page no. 80047.

Details for transport of specimens to Sydney Children's Hospital:

- **Monday Friday**: Contact to make arrangement for collection of specimens
  Dr Rose Ffrench (Senior hospital scientist) on 93821790, or
  Ms Kidest Nadew (Clinical Nurse Consultant in HIV) on 93821654 or via SCH switchboard 9382111 page no. 43027.
- **Weekend or after hours**: contact SCH switch and ask for Professor John Ziegler (paediatric immunologist), pager 44115.

**Key points**
<table>
<thead>
<tr>
<th>Key Point</th>
<th>Level of evidence</th>
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<tbody>
<tr>
<td>Use of antiretrovirals (antenatal, intrapartum and in the newborn period) decreases the risk of mother to child transmission.</td>
<td>5,6</td>
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<tr>
<td>Elective Caesarean section may decrease the risk of MTCT</td>
<td>9</td>
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<tr>
<td>Breast milk feeding increases the risk of MTCT</td>
<td>7</td>
</tr>
<tr>
<td>Mandatory notification to Department of Health</td>
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</tbody>
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**References**


15. The International Perinatal HIV Group. Duration of ruptured mebranes and vertical transmission of HIV-


25. MMWR. 1995 Revised guidelines for prophylaxis of *Pneumocystis carinii* pneumonia for children infected or perinatally exposed to human immunodeficiency virus. National Pediatric and Family HIV Resource Centre and National Centre for Infectious Diseases, Centre for Disease Control and Prevention.


Last Reviewed: September 2003