Preventing postnatal HIV transmission in resource-limited settings: feasibility and effectiveness of WHO guidelines Option A and B at population level

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Care, Commitment and Communication for a Healthier World
Background

WHO guidelines on preventing postnatal HIV transmission for breastfeeding infants

**Option A** - Extended antiretroviral prophylaxis for infants from birth until 1 week after all exposure to breastfeeding

**Option B** - Maternal triple antiretroviral prophylaxis throughout breastfeeding period and 4–6 weeks of prophylaxis for infant
Rationale for the study

• Field implementation of extended infant prophylaxis (option A) in resource-limited settings
  - Understanding of guidelines
  - Dosage adjustment
  - Measurement of syrup
  - Initiation of antiretroviral therapy (ART) for eligible mother
Questions

• How effective is Option A in preventing postnatal transmission at the field level of resource-limited settings?

• How does that compare with Option B?
Methods

1. Development of decision analytic model to estimate the overall postnatal transmission rate
   - Risk of transmission based on the estimates by UNAIDS and results from HPTN046 trial*

2. Analysis – postnatal HIV transmission at 6months
   - Zambia national data on PMTCT coverage for 2010 and data from field implementation of the guidelines

Decision model – Option A

- **Option A (postnatal)**
  - extended NVP regimen for infant

- Mother already on ART
  - CD4 ≤ 350
    - Infant prophylaxis
    - no infant prophylaxis

- Infant prophylaxis

- Infant prophylaxis

- Mother did not start ART
  - CD4 > 350
    - Infant prophylaxis extended regimen
    - no infant prophylaxis

- Infant prophylaxis extended regimen

- Infant prophylaxis
Decision model – Option B

- **mother already on ART**
  - **CD4 ≤ 350**
    - mother started ART or 3ARVs
    - infant prophylaxis
  - did not start ART or 3ARVs
    - infant prophylaxis
    - no infant prophylaxis

- **mother not on ART**
  - **CD4 > 350**
    - mother started 3ARVs
    - infant prophylaxis
    - no infant prophylaxis
  - did not start 3ARVs
    - infant prophylaxis
    - no infant prophylaxis

- option B (postnatal) maternal ARVs and infant NVP or AZT for 4-6 weeks

The decision model outlines the following steps:

1. **Mother already on ART**
   - If CD4 ≤ 350, the mother either starts ART or 3ARVs, followed by infant prophylaxis, or does not start ART or 3ARVs, leading to no infant prophylaxis.
   - If CD4 > 350, the mother starts 3ARVs, then infant prophylaxis, or does not start 3ARVs, then no infant prophylaxis.

2. **Mother not on ART**
   - If CD4 ≤ 350, the mother either starts ART or 3ARVs, followed by infant prophylaxis, or does not start ART or 3ARVs, leading to no infant prophylaxis.
   - If CD4 > 350, the mother starts 3ARVs, then infant prophylaxis, or does not start 3ARVs, then no infant prophylaxis.

The model includes the following options:

- Infant prophylaxis
- No infant prophylaxis
## Data used for model input

### PMTCT services in Zambia

<table>
<thead>
<tr>
<th>On ART before pregnancy</th>
<th>14.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD4 level $\leq$ 350 cells/mm³</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Option A</strong></td>
<td><strong>Option B</strong></td>
</tr>
<tr>
<td>Eligible mother who started treatment</td>
<td>Mother who started prophylaxis or treatment</td>
</tr>
<tr>
<td>ARV prophylaxis for infant</td>
<td><strong>Mother on ART/3ARVs</strong></td>
</tr>
<tr>
<td></td>
<td>Mother not on ART/3ARVs</td>
</tr>
</tbody>
</table>

Ministry of Health, Zambia Joint EMCT and ART National Strategy and Operational Plan 2011-2015: Eliminating Mother-to-Child Transmission of HIV and Scaling up HIV Care, Treatment and Support for Children, Adolescents and Adults
Results
Option A

- **mother already on ART (14.9%)**
  - Infant prophylaxis (57%)
  - No infant prophylaxis (43%)

- **mother not on ART (85.1%)**
  - CD4≤350 (50%)
    - Mother started ART (28%)
      - Infant prophylaxis extended regimen (28.5%)
      - No infant prophylaxis (71.5%)
    - Mother did not start ART (72%)
      - Infant prophylaxis extended regimen (28.5%)
      - No infant prophylaxis (71.5%)
  - CD4>350 (50%)

**Estimated transmission (6 months postnatal)**
- 0.96%
- 1.2%
- 1.2%
- 1.5%
- 6.3%
- 9.4%

**Total transmission 4.0%/6 months ↓
3162 postnatal infections**

**per 79,000 HIV-infected mothers in 2010, Zambia**
- 1.2%
- 3.1%
Option B

Estimated transmission (6 months postnatal)

- 0.96%
- 1.2%
- 1.2%
- 1.5%
- 8.4%

Total transmission 1.9%/6 months
1478 postnatal infections

per 79,000 HIV-infected mothers in 2010, Zambia
Estimated postnatal transmission of HIV at 6 months per 79,000 HIV-infected pregnant women needing ARV for PMTCT in 2010, Zambia

**Option A**  total transmission 4.0% 3162 infections

**Option B**  total transmission 1.9% 1478 infections

**Best case**  total transmission 1.2% 916 infections
## Sensitivity analysis

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Postnatal transmission at 6months (%)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Option A</td>
<td>Option B</td>
</tr>
<tr>
<td><strong>Infant prophylaxis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td>4.1</td>
<td>1.9</td>
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<tr>
<td>70%</td>
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<td>3.9</td>
<td>1.8</td>
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<tr>
<td>100%</td>
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<td>3.6</td>
<td>1.8</td>
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<tr>
<td><strong>ART initiated for eligible mother</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>30%</td>
<td></td>
<td>4.0</td>
<td>1.9</td>
</tr>
<tr>
<td>60%</td>
<td></td>
<td>3.1</td>
<td>1.9</td>
</tr>
<tr>
<td>90%</td>
<td></td>
<td>2.1</td>
<td>1.9</td>
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</table>
Conclusions

• Possibility of higher postnatal transmission of HIV for Option A at the field level
  - ART initiation for eligible mother
  - Infant prophylaxis

• Careful consideration required for the selection of guideline options and its field implementations
Acknowledgements

Ministry of Health, Zambia
MoH-JICA SHIMA project
Chongwe District Medical Office