Child Health and Survival, Breastfeeding and PMTCT

Basics of Paediatric HIV Prevention and Care, Cape Town, 2012

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Talk Outline

- Child Health And Survival: Poor Progress In South Africa
- Breastfeeding Reduces Malnutrition And Child Deaths
- ARVs Reduce Postnatal MTCT
- Breastfeeding As The Default
  - Routine
  - Sick Mothers
  - Heat – Treatment
  - Feeding Preterm Infants
  - Milk Banking
  - Who Should Be Formula Fed?
- Key Messages
Child Health and Survival: Poor Progress in South Africa

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Millennium Development Goals

- MDG 4: Reduce U5MR by two thirds.
- MDG 5: Reduce maternal mortality by 75%.
- MDG 6: Reduce MTCT of HIV to less than 5%.
## Goal 4: Reduce Child Mortality

<table>
<thead>
<tr>
<th>Goal and Indicators</th>
<th>1994 Baseline (or closest year)</th>
<th>Current Status 2010 (or nearest year)</th>
<th>2015 Target</th>
<th>Target Achievability</th>
<th>Indicator Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of 1 year-old children immunised against measles</td>
<td>68.5 (2001)</td>
<td>98.3 (2009)</td>
<td>100</td>
<td>Likely</td>
<td>MDG</td>
</tr>
<tr>
<td>Immunisation coverage under 1 year of age</td>
<td>66.4 (2001)</td>
<td>95.3 (2009)</td>
<td>100</td>
<td>Likely</td>
<td>Domestic</td>
</tr>
<tr>
<td>Life expectancy at birth for males and females</td>
<td>57.6 (2001)</td>
<td>64.8 (2001)</td>
<td>60.4 (2007)</td>
<td>Unlikely</td>
<td>MDG</td>
</tr>
<tr>
<td>Diarrhoea incidence under 5 years of age (per 1,000)</td>
<td>138.0 (2001)</td>
<td>132.6 (2009)</td>
<td>No target</td>
<td>Not applicable</td>
<td>Domestic</td>
</tr>
<tr>
<td>Pneumonia incidence under 5 years of age (per 1,000)</td>
<td>21 (2003)</td>
<td>102.1 (2009)</td>
<td>No target</td>
<td>Not applicable</td>
<td>Domestic</td>
</tr>
</tbody>
</table>

Source: The 2010 MDG South African Country Report
Figure 4.1: Under-Five Mortality Rate in South Africa since 1998, and the 2015 MDG

- 2015 MDG Target: 20
- 2007: 104
- 2001: 97
- 1998 (SADHS): 59

Under-five mortality rate per thousand live births

Source: 1998 South Africa Demographic and Health Survey, 2001 Census & 2007 Community Survey, South Africa
Paediatric Mortality in South Africa

Most children died of:

- HIV
- Malnutrition
- Poverty

Saving Children 2009
Figure 7. HIV status of children who died: 2005-2009

Figure 4. Nutritional status of children who died: 2005-2009

- OWFA: 7.8%
- Normal: 34.3%
- UWFA: 29.5%
- Severe malnutrition: 21.6%
- Unknown: 0.8%

Breastfeeding Reduces Malnutrition And Child Deaths

Child Health And Survival: Poor Progress In South Africa

Breastfeeding Reduces Malnutrition And Child Deaths

ARVs Reduce Postnatal MTCT

Breastfeeding As The Default
  Routine
  Sick Mothers
  Heat – Treatment
  Feeding Preterm Infants
  Milk Banking
  Who Should Be Formula Fed?

Key Messages
Breastfeeding Saves Lives

Relative risk of infectious disease mortality from never breastfeeding

- < 2 mths: 5.8 [95% CI: 3.4–9.8]
- 4–5 mths: 2.6 (95% CI: 1.6–3.9)
- 6–8 mths: 1.8 (95% CI: 1.2–2.8)
- 9–11 mths: 1.4 (95% CI: 0.8–2.6)

The Additional Risk of Death from not Breastfeeding is increased by Poverty and Poor Hygiene

Poverty, overcrowding, unsafe water, poor sanitation and hygiene
Exclusive Breastfeeding Enhances the Benefits of Breastfeeding

It is an intervention that is affordable, has multiple impacts and empowers individual citizens to make a difference to the health of the nation in a very meaningful way.*

*Kroon, Westwood: Cape Times 1st December 2011
Mortality trend in selected countries

Brazil

IMR

1990 2009

17 46

56 21

% Exclusive breastfeeding practice in Brazil

0-3 months

4-6 months

<6 months

Trend EBF < 6mo

South Africa

IMR

1990 2009

48 43

62 62

% Exclusive breastfeeding practice in South Africa

0-3 months

4-6 months

<6 months

Trend EBF < 6mo


Sources: DHS 1998, 2003

Source: UN Inter-agency Group for Child Mortality Estimation, 2010
How are we doing with Exclusive Breastfeeding?

Source: DHS surveys
Preliminary data: feeding practices of HIV positive women national 6 week PMTCT survey 2010
ARVs Reduce Postnatal MTCT

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Key Messages
## The Good News! Preliminary data - Infant HIV Exposure and MTCT Rate Measured at 4-8 weeks

<table>
<thead>
<tr>
<th>Province</th>
<th>Infant HIV exposure (%)</th>
<th>MTCT (%) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>30.0 (26.3-33.7)</td>
<td>3.5 (1.2-5.8)*</td>
</tr>
<tr>
<td>Free State</td>
<td>31.1 (28.9-33.3)</td>
<td>5.7 (3.5-7.9)</td>
</tr>
<tr>
<td>Gauteng</td>
<td>30.2 (27.7-32.8)</td>
<td>2.3 (1.3-3.3)</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>43.9 (39.7-48.0)</td>
<td>2.8 (1.7-4.0)</td>
</tr>
<tr>
<td>Limpopo</td>
<td>22.6 (20.4-24.8)</td>
<td>3.4 (1.0-5.8)</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>36.2 (33.6-38.9)</td>
<td>6.2 (4.5-7.9)</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>15.6 (13.0-18.3)</td>
<td>1.9 (0.1-4.5)*</td>
</tr>
<tr>
<td>Northwest</td>
<td>30.9 (28.6-33.1)</td>
<td>4.6 (3.0-6.1)</td>
</tr>
<tr>
<td>Western Cape</td>
<td>20.8 (16.8-24.9)</td>
<td>3.3 (1.3-5.2)</td>
</tr>
<tr>
<td>National</td>
<td>31.4 (30.1-32.6)</td>
<td>3.5 (2.9-4.1)</td>
</tr>
</tbody>
</table>

Goga et al MRC 2011
MTCT in 100 HIV+ Mothers by Timing of Transmission

- Uninfected: 63
- Breastfeeding: 15
- Pregnancy: 7
- Delivery: 15
Individual Choice Vs Public Health Approach

- Breastfeeding improves child health & nutrition and reduces child mortality
- Not breastfeeding decreases postnatal transmission but increases mortality and morbidity
- Greatest HIV and IMR burden is in the communities where not breastfeeding is most hazardous

Should Aim to Reduce Postnatal Transmission and Retain Health and Survival Benefits of Breastfeeding
Benefits of early weaning for HIV prevention are counterbalanced by risks of uninfected mortality in resource-poor countries.

Theoretical Framework For Age-specific Risk Assessment Model Timing For The Safe Introduction Of Replacement Feeding

Additional Risk of Death

0

0

Not Breastfed

Breastfed

optimum

Age

Jay Ross & Ellen G. Piwoz
Risk factors for postnatal transmission: Maternal immune status

Hazard ratio for postnatal HIV transmission

BHITS meta-analysis, Read et al (CROI 2003)
Evidence for Risk Reduction

- 1999- Exclusive BF (Coutsoudis, Coovadia)
- 2008 SWEN (Ethiopia, India, Uganda) - NVP 6 wks
- 2008 PEPI (Malawi) – NVP 14 wks
- 2010 BAN (Malawi) – NVP 28 wks
- 2011 HPTN046 – NVP 6 wks vs NVP 14 wks
- Kesho Bora - ART
- Mma Bana - ART
- DREAM - ART (Cohort study)
ARVs reduce the Risk Of BF Transmission to less than 1%
If BF Transmission Is Reduced by EBF and ARVs, There’s No Safe Time To Introduce Replacement Feeding

Additional Risk of Death

Not Breastfed

Breastfed

Lines don’t intersect so NO optimum age to introduce formula

Age
HPTN 046

- dNVPp for 6 wks + placebo vs dNVPp for 6 months
- Overall VT @ 6/12: **NVP = 1.2%**; Placebo = 2.4%; p=0.048 (Loses significance after 6 months)
- Maternal CD4 > 350: 6; 9/12: **NVP = 0.7%; 0.9%** and Placebo = 2.8 and 3.3%. (p=0.014)
- CD4 > 350 treated (ART) **only 0.5% risk** of vertical transmission at 6, 9 and 12 months.
- CD4 < 350 untreated – no difference between dNVPp and placebo 4.38% vs 8.1% @ 6 months (p=0.48); **8.9% vs 9.8% at 12 months** (p= 0.85) !
- 2/3 deaths in 2nd 6 months after BF cessation
HAART

- **Mma Bana:** ART from 26-34 wks gestation to weaning @ 6/12 - Postnatal VT= 0.4%; overall=1.3%

- **Kesho Bora:** 855 Women with CD4 = 200 - 500c/ml randomised to receive ART or dual therapy during pregnancy. Standard infant prophylaxis with sdNVP and 1/52 AZT. ART continued during breastfeeding. Significant reduction in VT and VT or Death at 6 wks, 6 months and 12 months

- **HPTN 046:** Women on ART at randomisation (30%) had only 0.5% risk of vertical transmission at 6, 9 and 12 months. CD4 < 350 untreated – no significant difference between dNVPp and placebo 4.38% vs 8.1% @ 6 months (p=0.48); 8.9% vs 9.8% at 12 months (p= 0.85)!
Breastfeeding As The Default

Evidence that ARV cover dramatically reduces MTCT during breastfeeding is “game-changing”

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Who Should Be Formula Fed?

Key Messages
2010 Policy

**WHO**
- Countries should choose default feeding option
- Formula feeding only if safe
- Maternal ARVs or infant dNVP for duration of BF

**South Africa**
- adopts an approach to infant feeding that maximizes child survival, not only the avoidance of HIV transmission.
- Tshwane Declaration August 2011
2010 National Guidelines

- All mothers who are known to be HIV-infected either on lifelong ART or not, who exclusively breastfeed their infants should do so for 6 months, introduce appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life.

- Mothers who are known to be HIV-infected, and not on lifelong ART, who decide to stop breastfeeding at any time should do so gradually during one month whilst the baby continues to receive daily NVP which should continue for one week after all breastfeeding has stopped.
Feeding HIV Infected Infants

- WHO: BF for 2 years and more
- Usual Vit A and micronutrients
- Better nutrition, health and survival
- Good data to support this (MASHI Botswana)
- Greater benefit with EBF for first 6 months
- Then add family foods
- PCR generally > 1 month
- Problem if not BF at the time of diagnosis
- Consider relactation or donor milk
Routinely Recommend EBF

- Restoration of Breastfeeding Generally
- Regulations on Marketing of Breastmilk Substitutes (Protect)
- Social Mobilisation (Promote)
- MBFI at facility and CBS once home (Support)
- Remove antenatal offer of **free** formula – advise mother if formula inappropriate
- Only prescribe formula for specific indications
- Demonstrate + back-demonstrate formula preparation
Partial BF Feeding Is Better Than No BF

- Survival Exclusive BF > Predominantly BF > Partial BF > Formula Feeding.

- Coutsoudis 2003– Never BF 7x more hospitalisation than ever BF.

- Mixed feeding on SWEN, PEPI, BAN, etc

- Mixed feeding phobia needs to stop

- Mixed feeding is not a reason to stop BF
## Why Do Mothers in South Africa Stop Breastfeeding

<table>
<thead>
<tr>
<th></th>
<th>n(%) Stopping Breastfeeding by 12 Weeks</th>
<th>Unadjusted Crude OR (95% CI)</th>
<th>Model 1 Adjusted OR (95% CI)</th>
<th>Model 2 Final Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breast problem or infection between birth and 6 weeks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>130/715 (18.2)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>38/90 (42.2)</td>
<td>3.2 (2.0 - 5.3)</td>
<td>3.0 (1.7 - 5.4)</td>
<td>3.1 (1.7 - 5.7)</td>
</tr>
<tr>
<td>Missing</td>
<td>37/148 (25.0)</td>
<td>1.5 (1.0 - 2.2)</td>
<td>1.4 (0.9 - 2.1)</td>
<td>1.4 (0.9 - 2.3)</td>
</tr>
<tr>
<td><strong>Antenatal feeding intention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBF</td>
<td>63/390 (15.9)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PBF/MF</td>
<td>71/404 (17.6)</td>
<td>1.1 (0.7 - 1.6)</td>
<td>1.2 (0.8 - 1.6)</td>
<td>1.3 (0.9 - 1.8)</td>
</tr>
<tr>
<td>Not BF</td>
<td>51/94 (54.3)</td>
<td>6.2 (3.8 - 10.2)</td>
<td>5.6 (3.5 - 8.7)</td>
<td>5.6 (3.4 - 9.4)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>9/21 (42.9)</td>
<td>3.9 (1.6 - 9.8)</td>
<td>3.9 (1.5 - 9.7)</td>
<td>4.1 (1.5 - 10.8)</td>
</tr>
<tr>
<td><strong>Mothers HIV status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>178/888 (20.1)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Positive</td>
<td>27/66 (40.9)</td>
<td>2.7 (1.6 - 4.6)</td>
<td>1.7 (0.9 - 3.0)</td>
<td>1.7 (1.0 - 2.8)</td>
</tr>
<tr>
<td><strong>Mother earns money for herself</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>115/620 (18.6)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>84/295 (28.5)</td>
<td>1.7 (1.2 - 2.4)</td>
<td>1.9 (1.3 - 2.8)</td>
<td></td>
</tr>
</tbody>
</table>

Model adjusted for study arm and site

Source: PROMISE EBF study
Back to work scenario...

- Regulations to protect maternity benefits and breastfeeding in the work place.
- BF/EBM expressing spaces, day care at work place
- Advance planning
- Build stock of frozen EBM
- Express milk for while at work
- ? Conditional grant for breastfeeders
Sick Mothers

- Separation – temporary DBM
- High viral load – HTOMM or DBM until adequate ART
- Maternal Death – DBM or formula (??? Wet nursing)
- Mastectomy/chemotherapy – DBM or Formula
- Only recommend formula if “AFASS” compliant or if no other option
Follow-up of PEPI subjects: 2188 Infants HIV-negative at 14 weeks

- VT in ART-eligible (CD4<250) treated vs ART-eligible untreated vs ART ineligible in cases per 100 person-years
  - ART-ineligible: VT = 3.66 (2.86 - 4.81)
  - ART-eligible treated: VT = 1.79 (0.58 - 4.18)
  - ART-eligible untreated: VT = 10.56 (7.91 – 13.82)
  - Ratio of VT in ART-eligible treated vs untreated = 0.18 (0.07 – 0.44)

JID: 15 Nov 2009
Pasteurised Own Mother’s Milk

- Pretoria Pasteurisation
- Flash-Heat Treatment
- Preterm infants
- Mastitis, High Viral Load, oral ulceration
- Empowers women to act at times of high transmission risk
FLASH PASTEURISATION METHOD

1. Equipment: Stove or flame, pot(±1L), glass jar, weight to stop jar toppling over, feeding cup.

2. Wash hands well with soap and hot water and dry with clean towel.

3. Express 50 to 150ml breastmilk into sterile glass jar, cover jar.

4. Place pot with the jar of expressed breastmilk (EBM) on stove.

5. Place weight on jar of EBM to keep it stable.

6. Pour tap water into the pot to 2 fingers above level of EBM in jar.

7 a) Switch stove on high.
    b) Bring water in pot to rapid boil
    c) Switch stove off and........

8. Immediately remove;
   a) Weight from jar,
   b) Pot from stove and
   c) Jar of EBM from hot water.

9. Cool EBM before feeding baby. Pasteurised EBM can be kept in the fridge for up to 24 hours

10. When at room temperature, cup feed pasteurised EBM to your baby.

11. Wash the jar, lid and cup in hot, soapy water.

12. To sterilise: Place in pot, sub-merge in hot water and boil on stove for ± 10 minutes.
Flash Station
HIV-Exposed Preterm Infants

- No specific feeding guidelines in national or global guidelines: No PMTCT efficacy data in this group and formula increases risk of NEC/sepsis.
- Risk of PnVT ↑due to immature gut and inadequate pre-delivery ARV exposure
- Pasteurised own mother’s milk best but use Donor milk if POMM not available (fortify)
- Revisit feeding choice close to discharge
- Formula milk as an option of last resort
Henderson et al. Formula milk versus maternal breast milk for feeding preterm or low birth weight infants. Cochrane Neonatal Review.

- No eligible studies

- Implications for practice: Maternal breast milk remains the default choice of nutrition for feeding preterm or low birth weight infants because of .... non-nutrient advantages, and because nutrient fortification ....

- Implications for research: Data from observational studies, and meta-analyses of trials that compared feeding with formula milk versus donor breast milk, suggest that feeding with breast milk has major advantages, for preterm or low birth weight infants.
Formula milk versus donor breast milk for feeding preterm or low birth weight infants. Cochrane Neonatal Review. Quigley et al.

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Formula milk n/N</th>
<th>Donor breast milk n/N</th>
<th>RR (fixed) 95% CI</th>
<th>Weight %</th>
<th>RR (fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross 1983</td>
<td>3/26</td>
<td>1/41</td>
<td>4.73 [0.52, 43.09]</td>
<td>8.09</td>
<td></td>
</tr>
<tr>
<td>Tyson 1983</td>
<td>1/44</td>
<td>0/37</td>
<td>2.53 [0.11, 60.39]</td>
<td>5.65</td>
<td></td>
</tr>
<tr>
<td>Lucas 1984a</td>
<td>4/76</td>
<td>1/83</td>
<td>4.37 [0.50, 38.23]</td>
<td>9.97</td>
<td></td>
</tr>
<tr>
<td>Lucas 1984b</td>
<td>5/173</td>
<td>2/170</td>
<td>2.46 [0.48, 12.49]</td>
<td>21.03</td>
<td></td>
</tr>
<tr>
<td>Schanler 2005</td>
<td>10/88</td>
<td>5/78</td>
<td>1.77 [0.63, 4.96]</td>
<td>55.26</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>407</td>
<td>409</td>
<td></td>
<td>100.00</td>
<td>2.46 [1.19, 5.08]</td>
</tr>
<tr>
<td>Total events: 23 (Formula milk), 9 (Donor breast milk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for heterogeneity: Ch² = 0.99, df = 4 (P = 0.91), I² = 0%</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.43 (P = 0.02)</td>
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<td></td>
</tr>
</tbody>
</table>
Quigley et al. Formula milk versus donor breast milk for feeding preterm or low birth weight infants. Cochrane Neonatal Review.

- Meta-analysis of data from five trials
- Statistically significantly higher incidence of necrotising enterocolitis in the formula fed group
- Relative risk 2.5 (95% confidence interval 1.2, 5.1)
- Number needed to harm: 33 (95% confidence interval 17, 100).
Donor Milk Services

- ↓ with HIV - now ↑ again
- In Brasil: Network of milk banks in support of breastfeeding - ↓ ↓ in child mortality
- HMBASA – 3 models of milk banking.
- PATH policy briefs for SA
- August 2011: Tshwane Declaration in Support of Breastfeeding promotes Milk Banks
Replacement Feeding when “AFASS”

- Minority, by definition can afford to buy formula
- Check appropriateness of choice objectively
- If not appropriate explore reasons and try to resolve obstacles to facilitate best choice
- Encourage EBF + ART
- Support choice if insistent
- Safe formula feeding demonstration
Key Messages 1

1. Breastfeeding Has Lifelong Benefits For Mother And Infant

2. Highest HIV Burden Communities Are Often The Very Communities Where Not Breastfeeding Is Most Dangerous

3. HIV Exposed Infants Have Increased Mortality And Morbidity


5. MBFI, CBS and supportive leadership can increase EBF rates.
Key Messages 2


2. Maternal Viral Load Determines Transmission Risk And Treatment Reduces Maternal VL.

3. **Urgent Early ART For Those Who Qualify Is The Key Intervention To Reduce MTCT During Breastfeeding**
6. Determinants of poor health outcome in vertical HIV exposure

Reproductive age HIV negative women

Unsafe Sex -> HIV Positive Pregnant Women

TOP

Effective PMTCT -> HIV-exposed fetus/child

Sub-optimal or failed PMTCT

"Spill Over"

Uninfected

Optimal Infant care

Alive and well

Healthy Adult

Malnutrition Infection

Suboptimal care

Rescue care

Infected

Suboptimal care

Rescue care

Chronic HIV

Sub optimal or failed Care

Optimal Case Mx

HIV progression

Death

Transition to Adult Care

Kroon, Eley. Western Cape Province Burden of Disease Reduction Project, June 2007