The Vertical Transmission of HIV through Breast-Feeding in sub-Saharan Africa: A Public Health Quagmire

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Breastfeeding Advantages

- Nutritional value
- Immunologic protection
- Gastrointestinal infections
- Respiratory infections
- Otitis media
- Infantile diabetes
- Intellectual development

- Fertility return
- Postpartum hemorrhage
- Breast cancer
Lecture Outline

• HIV/AIDS epidemiology
• Vertical transmission (MTCT) of HIV
  – Scientific evidence
  – Public health intervention options
• RIING project
  – Grant structure and goals
  – Longitudinal study
  – Capacity building
    • Human resources
• In 2003:
  – 5 million children and adults became infected with HIV
  – 3 million people died of AIDS

Almost 38 Million People are Living with HIV/AIDS

Adult HIV/AIDS Infection Rate

Women & HIV

• By December 2003, women accounted for nearly 50% of all people living with HIV.
• In sub-Saharan Africa, women accounted for 57% of HIV cases.
HIV Transmission to Child Through BF: Scientific Evidence

• In middle 80’s, viable HIV virus isolated in breast milk, yet compound(s) in human milk destroy HIV virus in-vitro (Newburg & Yolken, 1992; Van de Perre, 1993)

• Seroconversion of breastfed children born HIV-
  – Women infected post-partum with HIV
  – Seroconversion after being breastfed by an HIV+ wet nurse

• Experimental study in Nairobi, Kenya showing a twofold increase in transmission among BFed vs. Formula Fed children
Vertical HIV Transmission from Mother to Child

Over one million children are infected now with HIV and there are about 1,500 new cases per day, mostly in developing countries (Sub Saharan Africa)

Overwhelming majority contract HIV via their infected mothers

- In-Utero
- At birth
- Breast-feeding
Of 100 women in community with 25% HIV prevalence at delivery, 25 women are infected with HIV.

Of the 25 women who are infected, 9 pass the virus to their infants. Of the 9 mothers who transmit the virus, 4 pass the virus through breastfeeding.
HIV Transmission to Child Through Breast-feeding

- 30 to 40% of HIV+ children infected through breast milk
- possible routes: milk, abscessed or cracked nipples
Prevention of Vertical Transmission through Breast-feeding: Voluntary Counseling and Testing

- Replacement infant feeding?
- Milk pasteurization?
- Antiretroviral therapies?
  (Connor et al. 1994; CDC 1998)
- Maternal vitamin A supplementation?
  (Nduati et al., 1995)
Replacement Feeding

• No testing and little contact with health care systems in countries where breast-feeding and HIV are highly prevalent among women.
• Alternative infant feeding practices (e.g. infant formula) safe in areas with poor sanitation?
• Discrimination against HIV+ women identified by community because they are not breast-feeding.
• Does EBF reduces the risk of transmission? (Coustodis 1999)
• Cumulative risk associated with prolonged EBF?
Milk Pasteurization?

- Wood
- Fuel
- Milk extraction system
- Thermometer
- Compliance
- Implications for milk banks?
Antiretroviral Therapies: AZT

Zidovudine (AZT)

- long term: starts in the 14th week of pregnancy, continues during delivery (IV) and the neonate is treated for six weeks following delivery. Reduces risk of vertical transmission among non Bfed babies by 70% at a cost of $1000 per person
- short term: starts in the 36th week of pregnancy, and continues during delivery (IV). Reduces risk of vertical transmission among non Bfed babies by 50% at a cost of $50 per person
Antiretroviral Therapies: Nevirapine

- Nevirapine
  - Uganda study found that Nevirapine can decrease substantially the risk of transmission through breast-feeding by providing one dosage to the mom during delivery and one dosage to the newborn within the first 72 hours of life.

- Cost: $4 per person.
Vitamin A

- Three randomized trials have failed to show any benefit in terms of decreased vertical transmission of HIV as a result of vitamin A supplementation of women at risk of deficiency of this vitamin
  - Tanzania
  - South Africa
  - Malawi
Prevention of Vertical Transmission through Breast-feeding: Voluntary Counseling and Testing

- Replacement infant feeding
- Milk pasteurization
- Antiretroviral therapies
  (Connor et al. 1994; CDC 1998)
- Maternal vitamin A supplementation
  Does not work
Key Unanswered Questions

• What are women told during VCT?
• Do women change their caregiving plans?
  – Feeding
  – Cleaning
  – Amount of contact with infant
• Are HIV- babies at a disadvantage if they are born to an HIV+ mom?
  – Does social support modifies this relationship?
• What strategies used by HIV+ women lead to better child growth and development outcomes?
  – Exclusive breastfeeding
  – Surrogate caregiver
Research to Improve Infant Nutrition and Growth (NIH Funded)

- Iowa State University  
  (PI: Grace Marquis)
- University of Ghana  
  (PI: Anna Lartey)
- University of Connecticut  
  (PI: Rafael Pérez-Escamilla)

Social scientist consultants
Daniel Sellen (U. Toronto)
Bob Mazur (ISU)
Live a Positive Life with HIV

- Take your drugs everyday to live longer
- Do regular exercises to keep healthy
- Eat a balanced diet to stay healthy and keep working for a living
- Show good mental outlook and feel good
- Practice safe sex to avoid re-infection
- Join an Association of people living with HIV/AIDS to share experiences and ideas
Prenatal VCT-1

NO

YES

HIV test

HIV-

HIV+

Prenatal VCT-2

(N=150)

Prenatal Interview (3rd trimester)

Birth Interview

One year of follow-ups
Contact Points

- Prenatal clinic
- Prenatal home
- Birth: hospital or home
- Home follow ups
Follow-up Surveillance & Interviews

- Morbidity and child feeding surveillance
  - Twice weekly
- Maternal and child anthropometry
  - Monthly
- Child motor development
  - Monthly
- Stigma, depression, social support, household economics, other...
  - Quarterly
- 24 hour home observation
  - Breast milk production, maternal-infant interactions, time allocation
  - N=50 per group @ 1, 3 and 6 months
DOCTORAL/MASTERS FELLOWSHIPS
GO BLACK STARS!