Informed choice in infant feeding decisions can be supported for HIV-infected women even in industrialized countries

Pamela Morrison^a, Kiersten Israel-Ballard^b and Ted Greiner^c

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Following the first report of HIV transmission through breast milk in 1985 [1], the US Centers for Disease Control issued a recommendation against breastfeeding by HIV-infected mothers [2]. In the last 25 years, prevention strategies in industrialized countries have evolved to reduce the risk of mother-to-child transmission (MTCT) of HIV to approximately 1–2% [3] through routine prenatal HIV testing, maternal/infant antiretroviral prophylaxis/therapy (whichever is appropriate) (ART), Cesarean section and avoidance of all breastfeeding [4–6]. These recommendations for breastfeeding avoidance in industrialized countries were based on two fundamental assumptions: there was a high risk of breastfeeding-associated transmission and replacement feeding was safe in industrialized country settings [7,8].

Over the next two decades, new research from low-income countries (LICs) began to call into question the first of these assumptions, as noted in a recent review [9]. Exclusive breastfeeding, combined with effective maternal/infant ART was shown to greatly reduce breastfeeding transmission. By mid-2011 at least eight studies demonstrated that early and appropriate ART combined with exclusive breastfeeding for up to 6 months reduces the postnatal transmission risk to 0–1% (Table 1) [10–17]. In a recent, large study with extensive follow-up [15], no cases of postnatal transmission occurred among women adherent to ART. This body of evidence underpins new WHO guidelines [18].

Pasteurization of the HIV-infected mother's own breast milk is probably the safest option and deserves more attention than it currently receives. In industrialized countries, pasteurization options include single-bottle or commercial grade pasteurizers or flash-heating breast milk over a flame or stove, using a simple method of bringing a pan of water containing a glass bottle of breast milk to a boil. Even this simple home-based method of pasteurization deactivates both cell-free and cell-bound HIV, resulting in loss of infectivity, while maintaining breast milk's nutritional, antimicrobial and immunological properties [19,20]. In LICs, WHO recommends heat treatment as an interim strategy for safely providing breast milk to HIV-exposed infants unable to breastfeed, during maternal ill-health, to avoid high viremia during mastitis or premature weaning, or when ART is unavailable [18]. Several multicountry studies demonstrate the feasibility of HIV-infected mothers flash-heating substantial volumes of breast milk over 6 months [21,22]. Outside the context of HIV, pumping or manually expressing breast milk has been a common practice among employed mothers. Exclusively, breast milk-feeding a baby for 6 months or longer is also common for very low birth weight, extremely premature babies [23] as well as those with cleft palate or neurological disorders. Use of a breast pump may simplify the process.

Although the assumption that artificial feeding from birth is without risk in industrialized countries is still common

^aInternational Board Certified Lactation Consultant in Private Practice, Rustington, England, ^bNo institutional affiliation, and ^cCollege of Human Ecology, Hanyang University, Seoul, South Korea.

Correspondence to Ted Greiner, PhD, Professor of Nutrition, College of Human Ecology, Hanyang University, 17 Haengdang-dong, Seoul 133–791, South Korea.

Tel: +82 2 2220 1208; fax: +82 2 2292 1226; e-mail: tgreiner@hanyang.ac.kr, tedgreiner@yahoo.com

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Table 1. Studies of postnatal HIV transmission rates.

References	Duration of exclusive breastfeeding	ART and/or prophylaxis	Postnatal transmission	Determined by first infant HIV-positive test result period
Palombi <i>et al.</i> [10]	6 months	Maternal HAART from 25 weeks gestation until weaning; infant sdNVP after birth	0.8% (2/251)	1–6 months
Kilewo <i>et al.</i> [11]	18 weeks	Maternal ZDV and 3TC from ~34 weeks gestation to 1 week postpartum; infant ZDV and 3TC from 0 to 1 week, then 3TC alone during breastfeeding	1% (4/398)	6 weeks–6 months
Kilewo <i>et al.</i> [12]	For a maximum of 6 months	Maternal HAART from 34 weeks gestation to 6 months postpartum; infant ZDV and 3TC up to 1 week of age	0.9% (4/441)	6 weeks–6 months
Marazzi <i>et al.</i> [13]	6 months; mothers advised to start weaning by 6 months ending within 2 months, but likely some breastfeeding for 6–12 months	Maternal HAART from 15 weeks gestation to 2 months after weaning; infant sdNVP after birth with AZT for 1 week	0.6% (2/341); 0.6% (2/239)	6 weeks to 6 months; 6–12 months
Peltier <i>et al.</i> [14]	6 months; mothers advised to wean at 6 months	Maternal HAART from 28 weeks gestation to 7 months postpartum; infant sdNVP after birth with ZDV for 1 week	0.44% (1/227)	6 weeks to 9 months
Shapiro <i>et al.</i> [15]	EBF for 93% of infants to weaning; 71% breast fed > 5 months; <1% > 6 months	Randomized and varied HAART regimens for mothers from 18 to 34 weeks gestation until weaning; all mothers also received supplemental AZT during labor; infant sdNVP after delivery with 1 month AZT	0.3% (2/709)	1–6 months
Homsy <i>et al.</i> [16]	EBF for 92% for 4 months, weaned at 5 months	Maternal FDC, median duration 5.2–20.3 months preceding delivery and during breastfeeding; Infant sdNVP post birth or sdNVP + ZDV 1 week	0% (0/109)	6 weeks of; age; 6 weeks after weaning
Thomas <i>et al.</i> [17]	6 months	Maternal HAART from 34 weeks gestation to 6 months postpartum; infant sdNVP at birth	0.8% (4/487)	6 weeks to 6 months

Inclusion criteria are as follows: mother or child received ART (usually means one to two drugs, used in early studies) and infants were exclusively breast fed and breastfeeding-associated transmission was defined as excluding transmission occurring in the first month postpartum. In HAART, three or more drugs for more effective treatment, used in later studies. 3TC, lamivudine; ART, antiretroviral therapy; AZT, azidothymidine (same drug as ZDV); BF, breastfeeding; EBF, exclusive breastfeeding; FDC, fixed dose combination (lamivudine, stavudine and nevirapine); NVP, nevirapine; sdNVP, single-dose nevirapine; ZDV, zidovudine (same drug as AZT).

(strengthened by journal titles and abstracts that systematically fail to state findings in language that links artificial feeding to increased morbidity [24]) research has begun to call this belief into question. Although reliable estimates of an association between breastfeeding and mortality are difficult to arrive at [25], substantial evidence links formula-feeding with increased morbidity [26,27] and mortality [28–30]. In the USA, conservative estimates of excess mortality due to suboptimal breastfeeding vary from 911 [29] to 720 [31] deaths per year, with approximately 400 being due to diarrhea alone [32]. Artificial feeding increases the risk of necrotizing enterocolitis and death among premature infants [33] and increases the risk for sudden infant death syndrome [34]. The UK Millennium Cohort Study [35] estimated that exclusive and sustained breastfeeding could prevent 53 and 27% of hospitalizations due to diarrheal and lower respiratory tract infections and partial breastfeeding could prevent 31 and 25%, respectively.

HIV-infected women living in industrialized countries have exhibited varied responses to policies calling for them to artificially feed. In a 1999 US case, an HIV-infected pregnant mother who stated her intention to breastfeed lost legal custody of her infant and was granted physical custody only if she complied with a court order to formula-feed [36]. Other reports in the literature have described various steps taken to ensure that HIV-infected women do not breastfeed [37]. Although seen as a last resort [38], threats to remove a child from parental custody have been based on the assumption that breastfeeding represents a clear danger to the child.

In a recent Australian case, Walls *et al.* [39] describe their care of a clinically well, pregnant HIV-infected woman wishing either to breastfeed or provide her child with pasteurized expressed breast milk. The mother was receiving ART, had an undetectable viral load and a CD4 cell count of more than 500 cells/ μ l. Citing research showing considerable risk, including that 11 of ingested breast milk equates to one act of unprotected sex [40], the authors recommended formula-feeding, claiming a duty of care to protect the infant. To prevent breastfeeding, the case was ultimately referred antenatally to child protection services. Walls *et al.* also stated concerns that heat treatment of breast milk cannot be recommended due to its inconvenience. The evidence presented above was not cited, leading us to conclude that this was a poorly evidenced opinion that fails to justify threatening a mother with loss of custody of her child. They also expressed concern about the risk of ‘mixed feeding.’ However, as HIV is inactivated by heat treatment, thereby eliminating risk of transmission during possible mixed feeding, this too appears to be overcautious.

In the UK, there has been growing concern that such decades-old policies are inadequate. First, queries about the possibility of breastfeeding have been coming from

HIV-infected pregnant women already receiving ART and aware of new reports of low risk of MTCT through breastfeeding [41]. Second, between 2004 and 2006, 78.6% of HIV-positive mothers living in the UK were born in sub-Saharan Africa [42] where breastfeeding is simultaneously the cultural norm, a cornerstone of child survival and a valued traditional practice with important social implications. Strong family and peer pressure to breastfeed and the stigma attached to artificial feeding in their home countries, which may identify them as HIV-infected [43–45], are among factors motivating these mothers. Implementation of such a no-breastfeeding policy may be particularly inappropriate for failed asylum-seekers repatriated to LICs with sufficient infant formula only for the flight home [46], leaving their babies’ food security at considerable risk. In such settings, recent research has found an inability to provide safe bottle feeds even among mothers with a high school education and a refrigerator at home [47].

In view of these concerns, the British HIV Association and the Children’s HIV Association jointly undertook a wide consultation and revision of infant feeding guidance for British HIV-infected mothers, which was formally published in March 2011 [48]. Although recommending formula-feeding for most HIV-infected mothers, this new guidance recognizes that a woman on effective triple ART, with a repeated undetectable viral load at delivery may, after careful consideration, choose to exclusively breastfeed for the first 6 months of her baby’s life. It points out the need for frequent follow-up, careful monitoring of maternal ART adherence until 1 week after weaning and monthly checks on maternal viral load and infant HIV status.

An analogous public health dilemma has existed around Cesarean section recommendations for HIV-infected mothers. Recent data demonstrate that ART during pregnancy results in an extremely low risk of MTCT during labor. Given the lack of clear evidence of benefit for elective Cesarean section [49], British HIV-infected women with a viral load less than 50 copies/ml are now able to choose vaginal delivery [50].

Similarly, we would argue that data lacking when industrialized country policies on HIV and infant feeding were formulated in the 1980s concerning, first, the extremely low risk of postnatal HIV transmission for women receiving appropriate ART with resulting undetectable viremia, second, the safety and feasibility of heat treatment of expressed breast milk and, third, the mortality risk of breastfeeding avoidance in industrialized countries argue for a rethinking of HIV and infant feeding policies in other industrialized countries. Following the British precedent, when appropriate preconditions exist, HIV-infected women should be supported in making informed infant feeding choices. We hope this article will help initiate discussions and that such changes in policy will be followed by continued research on all three of the

issues listed above. In particular, data on postnatal transmission are based only on efficacy trials and data on effectiveness under real-life conditions are also needed. In addition, we know too little still about the long-term effects of providing ART to healthy mothers or infants nor how well mothers will comply with such regimes over longer periods of breastfeeding.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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