

Leveraging Progress in Prevention of Mother-to-Child Transmission of HIV for Improved Maternal, Neonatal, and Child Health Services

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Abstract: Finding ways to leverage the substantial investment in prevention of mother-to-child transmission of HIV to address other maternal, neonatal, and child health threats is a priority. With increased emphasis on health systems strengthening and the integration of disease-specific initiatives within primary care, we propose three areas for consideration: 1) increased integration of service delivery; 2) adaptation of successful implementation models; and 3) a reconceptualization of the care continuums for prevention of mother-to-child HIV transmission and maternal, neonatal, and child health.

Key Words: HIV, implementation, PMTCT, scale-up

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Finding ways to leverage the substantial investment in HIV programs to address other significant health threats is a priority for ministries of health and donors alike. In countries with high HIV prevalence, prevention of mother-to-child transmission (PMTCT) activities are a natural first place to begin the effort, given the many commonalities with maternal neonatal and child health (MNCH): shared target populations and health care providers, similar care continuums, and an abundance of proven interventions. The success of each program is dependent on the other and to the attainment of Millennium Development Goals (MDG) 4 and 5, which call for the reduction in child and maternal mortality by two-thirds and three-fourths, respectively, by 2015.

With increased emphasis on health systems strengthening and the integration of disease-specific initiatives within primary care, now is the time to critically examine the PMTCT and MNCH platforms of care to synergize successes and mitigate mutual challenges. Building on the lessons of PMTCT, we propose three areas for consideration: 1) increased integration of service delivery, 2) adaptation and scale up of successful implementation models, and 3) a reconceptualization of the PMTCT and MNCH care continuums.

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STRIDES HAVE BEEN MADE

In 2009, US\$15.9 billion was invested by international donors and governments in the HIV response.¹ In addition to the rapid scale-up of antiretroviral (ARV) treatment (ART), there have been considerable gains in PMTCT, particularly in some of the highest burden countries. In low- and middle-income countries, the proportion of pregnant women tested for HIV increased from 7% in 2005 to 26% in 2009, and the percentage of HIV-infected pregnant women receiving ARV prophylaxis for PMTCT increased from 15% to 53% over the same period.² Several countries, including South Africa, Namibia, and Botswana, estimate that 85%–95% of HIV-infected pregnant women received ARV prophylaxis in 2009.²

Noteworthy strides have also been made in MNCH. Global maternal mortality decreased from 585,000 in 1990³ to an estimated 342,900 in 2008.⁴ Worldwide under-5 child mortality has decreased by a third, from 11.9 million deaths in 1990 to 7.7 million in 2010.⁵ In low- and middle-income countries, under-5 mortality has decreased by 27% and infant mortality by 28% over the past 20 years.⁶

SIGNIFICANT GAPS REMAIN

Although these improvements in PMTCT and MNCH are striking, we are far from the goal of eliminating mother-to-child transmission⁷ or of reaching MDG 4 and 5 by 2015. Almost half of HIV-infected pregnant women received no ARV prophylaxis in 2009, and many existing PMTCT programs continue to rely on single-dose nevirapine rather than more efficacious combination regimens, have limited or delayed access to therapeutic ART for eligible pregnant women, and report low rates of infant prophylaxis.

Women in sub-Saharan Africa have a 250-fold greater risk of dying during pregnancy and childbirth than those in higher-income countries,⁸ and 80% of maternal deaths in developing countries are caused by preventable obstetric causes.⁹ In 2010, 49.6% of the estimated 7.7 million under-5 child deaths occurred in sub-Saharan African, with <1% of the deaths occurring in high-income countries.⁵

THE RELATIONSHIP BETWEEN HIV AND MNCH

The impact of HIV may contribute up to 18% of maternal deaths,⁴ through increased risk of malaria, tuberculosis, and other infectious diseases for HIV-infected mothers. Moreover,

HIV has an extended effect, impacting maternal mortality over the first 24 months after delivery.^{11,12}

The link between maternal HIV and the health of the infant has been demonstrated, regardless of whether the child acquires HIV infection; infant mortality rates are 4 times higher in infants whose mothers died of HIV than those whose mothers were alive.¹³ Pediatric HIV infection results in >210,000 child deaths each year in sub-Saharan Africa, 4% of all child deaths.¹⁴ In high HIV-prevalence countries, a substantially higher proportion of deaths are attributable to pediatric HIV. For example, in South Africa, pediatric HIV accounts for 57% of all child deaths,¹⁵ and the child mortality rate has increased since 1990.¹⁰ PMTCT services aimed at preventing pediatric HIV and keeping HIV-infected mothers healthy will likely lead to decreased maternal mortality and improved infant survival in countries with high HIV prevalence.

PMTCT OPERATES WITHIN THE MNCH PLATFORM

The similarities between PMTCT and MNCH services are straightforward: services for both involve the mother–baby dyad, are often provided by the same clinicians, and involve a similar care continuum that spans a woman’s reproductive years and a child’s first years of life. PMTCT often operates as a subset of services within the larger MNCH platform. Both fields have a plethora of evidence-based interventions that have not yet been implemented at scale, and implementation would likely benefit from integrated service delivery at all levels of the health system, including primary health facilities.

Furthermore, the success of each field is dependent on continued progress in the other. An HIV-infected woman who receives PMTCT care but suffers an emergency obstetric complication will survive only if she has access to an appropriately equipped clinic, with sufficient numbers of skilled staff and adequate stocks of required medicines. Similarly, an HIV-infected woman who receives high-quality maternal health services but is either unaware of her HIV status or not offered appropriate HIV services may die of avoidable HIV complications or suffer the death of her HIV-infected child.

PMTCT program scale-up is dependent on MNCH system effectiveness. Recent estimates suggest that poor health system performance will limit the impact of the introduction of the new World Health Organization (WHO) guidelines on reducing MTCT rates in settings with high HIV prevalence.¹⁶ The more efficacious regimens will have minimal impact on MTCT unless MNCH care systems adapt to engage and retain women and infants through each step of care. Small losses of patients at each step yield compounded loss of efficacy as demonstrated by a South Africa study modeling the impact of PMTCT provided with 80% reliability (20% loss at each step), resulting in only 51% of women receiving a full package of care.¹⁶

LEVERAGING PMTCT TO IMPROVE MNCH

Integrated Service Delivery

Although there is some combined delivery of PMTCT and MNCH services, more often than not services are “siloed.”

Implementation of an integrated package of PMTCT and MNCH clinical services is practical from a delivery perspective, given that the majority of clinical providers for antenatal, labor, and postnatal care—particularly at the primary and secondary health level—are often the same staff as those administering PMTCT services. In countries with reliable PMTCT services such as high HIV testing during antenatal care (ANC), additional maternal or child health services can be bundled with or piggybacked onto PMTCT services.

Two different integration approaches could be considered. For HIV-infected women and infants engaged in PMTCT services, the package of care could be expanded to include essential MNCH interventions that are recommended at the first antenatal clinic visit (eg, high-risk pregnancy screening, tetanus immunizations, iron supplementation, and malaria prevention). Similarly, the use of well-established PMTCT interventions (eg, 6-week infant diagnostic testing) could be tied to essential maternal services that should occur after delivery, such as family planning counseling. The second approach would extend services provided within PMTCT to HIV-negative women and children. For example, the array of services that are part of the PMTCT package of care for HIV-infected pregnant women, such as infant feeding counseling, and those available for HIV-exposed infants, such as growth monitoring and prophylaxis of infections, can be extended to all children, regardless of HIV exposure.

Implementation Models

Although evidence-based prevention, care, and treatment interventions exist for MNCH, widespread effective implementation of these interventions has been inadequate. In sub-Saharan African countries, reliable application of proven essential MNCH interventions would avert nearly 4 million (85%) maternal, newborn, and child deaths.^{17,18} However, recent studies of the large-scale implementation of evidence-based MNCH interventions have not found the anticipated impact on outcomes. The First Breath Study, a multicenter randomized controlled trial in 6 countries, found no impact of implementing the WHO Essential Newborn Care package and a modified version of the American Academy of Pediatrics Neonatal Resuscitation Program¹⁹ on the primary outcome of neonatal death. Another study found no enhancement in child survival trends following implementation of UNICEF’s Accelerated Child Survival and Development bundle in focus districts as compared to control data obtained from nonfocus districts in 2 of the 3 West African countries evaluated.²⁰

Although not universal, there have been recent advances in effective implementation models for delivering PMTCT programs in resource-limited settings that could easily be extended to MNCH. For example, a combined quality improvement and stepwise scale-up approach was used to improve PMTCT implementation in Cape Metro District, South Africa.²¹ Working within the existing public sector district health system, teams from MNCH clinics worked collaboratively to identify and set aggressive process performance targets and then used a data-driven iterative improvement method to improve performance along the PMTCT care pathway. Using these low-cost interventions, antenatal zidovudine use increased

from 74% to 86%, PMTCT clients on ART increased from 10% to 25%, and postnatal HIV testing increased from 79% to 95%.

ICAP at Columbia University, with funding from the United States President's Emergency Plan for AIDS Relief, has supported implementation of PMTCT services in 13 countries in sub-Saharan Africa. Building on a framework of family-focused care, PMTCT is an entry point to comprehensive HIV prevention, care, and treatment services for the HIV-infected mother, her child, and her family members. Core components of ICAP's strategy include training and ongoing clinical mentorship of health care workers; infrastructure improvements such as enhancement of laboratory, procurement, and medical records; routine use of data for program evaluation; and capacity building of local and district health authorities. For example, the proportion of new clients in ANC who were counseled and tested for HIV at 80 ICAP-supported Ethiopian health facilities increased from 52% to 95% between 2006 and 2010, and the proportion of HIV-infected mothers receiving ARV prophylaxis (with multidrug regimens) increased from 0% to >99%. During the same period, the proportion of HIV-infected women delivering in health facilities increased from 63% to 92%, partner testing increased from 52% to 98%, and uptake of family planning services (dual protection) during postnatal care increased from 36% to 99% (written communication from Zenebe Melaku, 2011).

Leveraging the considerable support provided to PMTCT programs in the regions where it works, ICAP is extending this approach to MNCH to address high maternal mortality. At ICAP-supported health facilities, infrastructure improvements have been extended from the ANC to the maternity wards, PMTCT curricula and mentoring now include training on obstetric care, and postnatal services established for follow-up of HIV-infected mothers and babies now offer services to all those in MNCH care.

Reconceptualization of the Care Continuum for Both PMTCT and MNCH

The new 2010 WHO PMTCT guidelines have reframed the PMTCT care continuum to prioritize urgent treatment for eligible mothers for their own health and to expand the duration of prophylaxis throughout the period of exposure, from early pregnancy throughout breast-feeding.²² Successful implementation of this approach will be dependent on high levels of retention of mothers and babies across the entire PMTCT continuum of services.

The emphasis of PMTCT has shifted to recognize the relationship between the health of the baby and the health of the mother. Broader PMTCT services will result in fewer pediatric HIV infections and fewer HIV-related pediatric deaths. Earlier treatment of mothers will result in fewer pediatric HIV infections and fewer maternal and child deaths, given that mothers with advanced HIV disease have the highest rate of death, disease progression, and MTCT.²³

The MNCH care continuum historically refers to the continuity of individual care,²⁴ be it the care of the mother, the infant, or the child. These continuums need to be interlinked to follow and retain both mother and baby across time and place. To date, both PMTCT and MNCH programs have been facility-based and focused on patients who present for care.

Innovative approaches are needed to increase demand and health service utilization.

To reach PMTCT goals and MDG 4 and 5, both PMTCT and MNCH fields must shift from measuring and reporting the uptake of individual services (eg, HIV testing, ANC utilization, and availability of emergency obstetric facilities) to the retention of mother and baby across the entire care continuum and the number of mother–baby dyads who receive a full package of services.

CONCLUSIONS

In May 2010, the Global Fund to Fight AIDS, Tuberculosis and Malaria called for disease-specific initiatives, such as HIV, to link with MNCH programs using an integrated approach.²⁵ The global health community has an opportunity to leverage the knowledge and infrastructure that has been built to deliver PMTCT care over the past decade to benefit MNCH programs. Current research priorities are overwhelmingly focused on the development of new drugs and technologies rather than how to implement existing knowledge.²⁶ Given the burden of disease faced by women and infants around the world, now is the time to prioritize well-designed trials of a combined PMTCT–MNCH approach to dramatically reduce maternal and child deaths and to achieve MDG 4 and 5.

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