PUBLIC HEALTH LESSONS FROM A PILOT PROGRAMME TO REDUCE MOTHER-TO-CHILD TRANSMISSION OF HIV-1 IN KHAYELITSHA

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Objective. Short-course antiretroviral therapy (ART) has been shown to be effective in reducing mother-to-child transmission (MTCT) of HIV-1. This article details the public health lessons learnt from a district-based pilot programme where a short-course zidovudine (ZDV) regimen has been used in a typical South African peri-urban setting.

Methods. The pilot programme was initiated at two midwife obstetric units in January 1999. Lay counsellors conducted pre- and post-test counselling and nurses took blood for HIV enzyme-linked immunosorbent assay (ELISA) testing. Short-course ZDV was administered antenatally (from 36 weeks' gestation) and during labour. Mother-infant pairs were followed up at eight child health clinics where free formula feed was dispensed weekly. Infants received co-trimoxazole prophylaxis and were ELISA tested for HIV at 9 and 18 months. After 17 months protocol changes aimed at eliminating weaknesses included initiation of ZDV at 34 weeks, self-administration of the first dose of ZDV with the onset of labour, and rapid HIV testing for both mothers and infants.

Results. Voluntary counselling and testing was shown to be highly acceptable, with individual counselling more effective than group counselling. Based on less than optimal availability of records, ZDV utilisation was encouraging with up to 59% of subjects initiating treatment, 3 weeks' median duration of ZDV use, and up to 88% receiving at least one intrapartum ZDV dose. Self-administration of the intrapartum dose reached 41%.

Conclusions. Short-course antenatal and intrapartum ART to prevent MTCT of HIV1 was shown to be feasible.

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The Joint United Nations Programme on HIV/AIDS estimates that there were 620 000 new paediatric HIV infections worldwide in 1999,[1] almost all due to mother-to-child transmission (MTCT). In the developed world, significant reduction in MTCT has been achieved by the widespread use of relatively long courses of zidovudine (ZDV) in pregnancy (ACT G076),[2,3] widespread use of highly active antiretroviral therapy (HAART) and elective caesarean section. In developing countries, trials of short-course antiretroviral therapy (ART) have demonstrated reductions in transmission of one-half to one-third.[4-7]

In January 1999, the Western Cape Provincial Health Department implemented a pilot programme to prevent MTCT in the Khayelitsha health district. Since efficacy of the treatment intervention was not at issue, the purpose of limiting the programme to one health district was to gain a greater understanding of operational aspects of implementation as well as the acceptability of the intervention.

METHODS

Khayelitsha is a sprawling peri-urban settlement with a mix of formal and informal dwellings. It lies some 30 km from the Cape Town city centre and has an estimated population of 325 000. The background HIV prevalence (for the district) was estimated at 16% and 22% for the years 1998 and 1999, respectively.[8] There is no hospital, and the programme was implemented at the two midwife obstetric units (MOUs) in the district. The MOUs are staffed by midwives providing primary level maternity care, with referral of complicated cases. MOU1 has approximately double the patient load of MOU2. At booking, women attending the two MOU antenatal clinics were offered voluntary counselling and testing (VCT). The counselling content included an overview of HIV transmission risk, feeding practices, and the role of ART. Trained HIV counsellors did counselling and HIV enzyme-linked immunosorbent assay (ELISA) testing was done at a distant teaching hospital laboratory. Women received results of the test at the next visit.

Women at MOU1 made a choice to test after group counselling. Only those electing to test received individual counselling. At MOU2, women were allowed to make a choice after individual counselling. The employment and management of the counsellors was contracted out to Lifeline, an NGO specialising in this field.

Those accepting VCT and who subsequently tested HIV-positive were entered into the programme. At 36 weeks' gestation oral ZDV (300 mg twice daily) was commenced and dispensed weekly until the woman presented in labour, when ZDV (300 mg 3-hourly) was administered until delivery. On discharge, mothers were again counselled about the risk of transmission during breast-feeding. Formula feeds were

dispensed to those who chose not to breast-feed. Mother-to-child pairs were followed up at any one of eight child health clinics in the district where a weekly supply of formula (up to 6 months of age in the first period and up to 9 months in the second period) and co-trimoxazole prophylaxis (6 weeks to 18 months of age) were dispensed. Infants were ELISA tested for HIV at 9 and 18 months.

In June 2000, 17 months after commencement, changes to the programme were instituted to enhance the programme intervention. From ongoing surveillance it became apparent that booking gestational age was being underestimated. Commencement of ZDV was changed from 36 to 34 weeks' gestation and women were advised to self-administer the first dose of ZDV with the onset of labour. Protocol changes were also made in respect of testing. Because of long laboratory result turnaround times, on-site rapid HIV testing replaced the centralised laboratory-based ELISA tests. The change to rapid testing improved the follow-up and testing of infants as nurses at the child health clinics expressed a preference for performing heel-prick rapid tests over venepuncture in infants.

In the run-up to the protocol changes a novel management approach was employed combining central and local management expertise in a way that allowed each component of management to focus on its functions. The provincial level tasks concentrated on vertical support, freeing up financial resources, procuring drugs and supplies and ensuring necessary personnel and training. Local management focused on practical organisation of the service, staff motivation, consultation with community structures and organisations and patient follow-up. Co-ordination of the programme also required the involvement of managers from secondary and tertiary referral hospitals serving the district, as upwards of 20% of women entered into the programme were referred to these facilities for delivery.

A monitoring system to track the enrollment, testing, treatment and follow-up of all women presenting at the two MOUs was developed and implemented. The system relied on primary data collection by nurses using modified service logbooks and data forms. Data presented here are taken from the monitoring database, and we report point estimates (means or medians and proportions) from the programme audit over two successive periods, before (January 1999 - May 2000), and after (June 2000 - December 2000) the protocol changes described above were made.

RESULTS

Voluntary counselling and testing

Table I describes findings in respect of VCT. Mean gestational age at booking for women who accepted VCT was 26 weeks. In the first period (January 1999 - May 2000) there were 9 997 new bookings, of whom 7 229 (72%) accepted testing for HIV. Of the women tested, 1 185 (16%) were found to be HIV-infected and were enrolled into the programme. In the second period (June - December 2000) there were 4 142 new bookings; 2 790 women (67%) accepted HIV testing and 567 (20.3%) were HIV-infected.

HIV test acceptance was consistently higher at MOU2 (93% in both periods), and dropped in MOU1 from 61% in the first period to 50% in the second period. Test result turn-around time was 11 days in the first period. This was reduced to < 1 day in the second period following the change to rapid testing.

High rates of post-test counselling were achieved at both sites and in both time periods, 94% and 89% of HIV-positive women receiving post-test counselling in the first and second periods, respectively. The percentage of HIV-negative women who received post-test counselling increased from 87% to 98% over the two time periods. Altogether, over both time periods, 8 267 HIV-negative women received post-test counselling, representing 82.5% of all women accepting testing.

ZDV administration

In order to assess ZDV administration (as a proxy for compliance) all available records for women who were entered into the programme were reviewed at the end of both periods (Table II). These records represented 60% and 44% of participants in the first and second periods, respectively. Unavailable records were the result of referral to other facilities or poor record keeping.

Of 710 women whose records were reviewed from the first period, 463 (65%) received at least one week's supply of ZDV, 361 (51%) received at least 2 week's supply, and 160 (23%) received 4 weeks' supply. At first, the monitoring database was not structured to indicate the number of women who initiated treatment (as expected) at 36 weeks. This was adjusted to provide this information for the second period. Of the women 71% received at least one dose of ZDV during labour.

Of 252 (44%) records reviewed from the second period, 162 (64%) received at least one week's supply of ZDV, 143 (57%) received at least 2 weeks' supply and 81 (32%) received 4 weeks' supply. Of these 59% received their first supplies of ZDV at 34 weeks, representing successful treatment initiation; 88% of women received at least one dose during labour, and 41% self-administered the first dose of ZDV at the onset of labour (this practice was only commenced in the second time period).

There was an improvement in the number of women who received any form of ZDV treatment across both MOUs from 85% in the first period to 93% in the second period, the increase being greater in MOU2 than in MOU1. There was also improvement in the percentage of women who received 2 or 4 weeks' supply of ZDV in the second period compared with the first period. The median duration of ZDV use was 3 weeks. The proportion of women who received at least one dose of ZDV in

Table I. Voluntary counselling and testing

	January 1999 - May 2000			June - December 2000		
Indicator	MOU 1	MOU 2	Total	MOU 1	MOU 2	Total
New antenatal clinic bookings	6 437	3 560	9 997	2 438	1 704	4 142
HIV test accepted (%)	3 926/6 437 = 61%	3 319/3 560 = 93%	7 229/9 997 = 72%	1 210/2 438 = 50%	1 580/1 704 = 93%	2 790/4 142 = 67%
HIV+ (%)	661/3 926 = 17%	5 24/3 319 = 16%	1 185/7 229 = 16%	250/1 210 = 21%	317/1 580 = 20%	567/2 790 = 20%
Average turnaround time HIV results in days	11	10	11	< 1	< 1	< 1
HIV+ women post test counselled (%)	90	97	94	94	84	89
HIV– women post test counselled (%)	87	88	87	97	98	98

Table II. ZDV administration

	January 1999 - May 2000			June - December 2000		
Indicator	MOU 1	MOU 2	Total	MOU 1	MOU 2	Total
HIV+ deliveries	415	295	710	87	165	252
HIV+ who received any form ZDV treatment (%)	338/415 = 81%	265/295 = 90%	603/710 = 85%	77/87 = 89%	158/165 = 96%	235/252 = 93%
No. at least 1 week ZDV	265/415 = 64%	198/295 = 67%	463/710 = 65%	55/87 = 63%	107/165 = 65%	162/252 = 64%
≥ 2 weeks' antenatal ZDV (regardless of dose in labour)	204/415 = 49%	157/295 = 53%	361/710 = 51%	44/87 = 51%	99/165 = 60%	143/252 = 57%
≥ 4 weeks' antenatal ZDV (regardless of dose in labour)	90/415 = 22%	70/295 = 24%	160/710 = 23%	30/87 = 35%	51/165 = 31%	81/252 = 32%
No. at least 1 dose in labour	260/415 = 63%	245/295 = 83%	505/710 = 71%	70/87 = 81%	152/165 = 92%	222/252 = 88%
% women self-administered 300 mg at onset of labour	—	—	—	53%	29%	41%
Treatment initiation at 34 weeks' gestation	—	—	—	49%	69%	59%

the intrapartum period increased from 71% to 88% over the two periods.

Results from infant follow-up are not shown and will be analysed separately, particularly in respect of lessons to be learnt about formula feeding, co-trimoxazole prophylaxis and infant testing for HIV.

DISCUSSION

The percentage of women who opted for HIV testing at both MOUs across both time periods indicates good acceptability for VCT in those attending MOU2. This is likely to be the case in similar South African settings. Comparison of the two MOUs in the second period showed a significantly higher test consent rate at MOU2 (93%), where the HIV test is offered after individual counselling, compared with 50% at MOU1, where it is offered after group counselling. The lower test acceptance rates associated with group counselling are consistent with reports from a pilot project in Cote d'Ivoire,[9] indicating the superiority of individual over group counselling before a choice is made to test. Qualitative research in the two MOUs reveals that there is 95% acceptance by patients of individual counselling procedures (and at MOU1 half drop out before they come to individual counselling) (personal communication — S Magwaza). It is likely that use of the rapid test also led to an improvement in the administration of post-test counselling for all women. It is recommended that adequate resources be made available for the counselling component of any MTCT programme and that consideration be given to the outsourcing of the counselling service to NGOs dedicated to this function, as was the case in this pilot programme.

The rate for ZDV initiation at the prescribed gestational age (34 weeks after protocol changes) is an important indicator for measuring the success of the programme. At 59%, the pilot programme can be considered successful with some room for improvement. This conclusion is limited by the unavailability or records in both time periods under study. Although the rate of successful treatment initiation is substantially higher than similar programmes in Botswana and Zimbabwe,[10,11] rates of close to 70% have been achieved in Thailand.[12]

When considering that in developing countries other dedicated and long-established public health programmes (such as the Expanded Programme for Immunisation and most tuberculosis treatment programmes) have taken many years to achieve adequate coverage of over 60%, the achievements of the MTCT programme are encouraging, particularly given that the MTCT programme is not a stand-alone vertical programme but is fully integrated into the primary health care system. The relatively early average gestational age at booking indicates that commencement of ART at 34 or 36 weeks may generally be feasible in the urban South African setting.

The administration of at least one dose of ZDV in labour was high (71%) in this programme and improved over time. This improvement resulted from protocol changes in the second time period with the introduction of self-administration of the first dose in labour.

In the light of the complexity of ZDV administration, the use of even shorter courses of antiretrovirals must be given serious consideration. A two-dose regimen of nevirapine (NVP) (one dose to the mother at the onset if labour and one dose to the infant within 72 hours of birth) has been shown to reduce MTCT by 47%.[6]

Of the women in our programme 88% received an intrapartum dose. This has relevance to an NVP regimen. However, the low rate of self-administration (41%) of the first dose of ZDV with the onset of labour in this population may be cause for concern where NVP is being considered, since this (self-administration) is the preferred method of administration for NVP. A combination of self-administration and administration in the labour ward where the former is unsuccessful ought to achieve 'intrapartum only' treatment rates comparable to those described in this programme.

It is notable that various components of health service infrastructure are still fragmented by authority and level. A novel co-ordination mechanism termed 'vertical support' addressed these structural and functional problems. It is likely that the overall improvements in the programme following protocol changes were due to the management model employed. The correct management approach can have an overall impact on the success or otherwise of a programme such as this pilot programme at little additional cost.

CONCLUSION

Subject to the limitations imposed by less than optimal record availability, this study has shown that an MTCT programme is acceptable in a peri-urban South African setting and is sensitive to the availability of a dedicated service providing individual VCT.

The data show that a short-course ZDV regimen can be implemented in this setting, although it is logistically complex to implement. An 'intrapartum only' dose such as is the case with NVP is likely to be logistically easier to implement.

As NVP is yet to be tested in the field, it is recommended that the ZDV programme continue, allowing future comparisons between these two regimens. Further research on compliance is recommended. Further work is also required on regimens which lower transmission rates even further.

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AIDS IN AFRICA — SURVIVAL ACCORDING TO AIDS-DEFINING ILLNESS

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Objective. Evaluation of prognostic significance of the type of AIDS-defining illness (ADI) and performance status in a cohort of AIDS patients.

Design, setting, subjects, outcome measures. A retrospective analysis of 280 patients with AIDS, as defined by the proposed World Health Organisation (WHO) clinical staging system, who attended two Cape Town-based HIV clinics between 1984 and 1997. Patients were stratified according to the type of initial ADI. Survival associated with each opportunistic event was determined by Kaplan-Meier analysis. Cox proportional hazard analysis was used to determine relative risk for death associated with three strata of ADI.

Results. Median survival associated with various initial ADIs varied from less than 3 months (encephalopathy and wasting), to over 2 years (extrapulmonary tuberculosis and herpes simplex virus infection). This effect of ADI on outcome was most striking in patients with relatively preserved CD4 counts (CD4 > 50/μl). A performance status score 4 predicted 50% mortality at 1 month, irrespective of co-morbidity.

Conclusion. The type of ADI is an important determinant of survival, particularly in patients with preserved CD4 counts. The stratification of patients by type of ADI and performance status may be useful in the management of patients with advanced HIV infection in resource-limited environments.

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The disease burden caused by HIV infection has been overwhelming health care facilities in many African countries.[1] It has been suggested that African patients with HIV infection have an increased rate of progression from asymptomatic HIV infection to AIDS compared with patients in the developed world, and this difference has been related to limited access to

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