Evaluation of the Effectiveness and Efficiency of Universal Antenatal HIV Testing Programme in Hong Kong – Review of the Years 2001 to 2004

Scientific Committee on AIDS

co-sponsored by the Hong Kong Advisory Council on AIDS
and
the Centre for Health Protection,
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About the Scientific Committee on AIDS (SCA)

The Scientific Committee on AIDS (SCA) was renamed from the former Scientific Working Group on AIDS. Its terms of reference and membership are as follows:

Terms of reference

(a) to advise on the effective surveillance of HIV/AIDS, and the monitoring of the situation as it relates to Hong Kong;
(b) to advise on the development of effective clinical and public health programmes on HIV/AIDS in Hong Kong;
(c) to establish rationale and develop principles on the effective prevention, treatment and control of HIV infection in Hong Kong;
(d) to promote the development of research agenda on HIV/AIDS and its related areas in Hong Kong; and
(e) to promote regional and international collaboration of research activities in HIV/AIDS. (Note : new item proposed by SCA members)

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EXECUTIVE SUMMARY

Mother-to-child transmission (MTCT) is an important route of HIV transmission worldwide. From a health promotion perspective, it is important to have a public health programme where MTCT of HIV infection can be prevented and the infected mother and their newborns can be adequately taken care of by existing health care infrastructure. In light of international and local developments, Hong Kong started a universal antenatal HIV testing (UAT) programme in September 2001. This report serves to evaluate the effectiveness and efficiency of UAT programme, based on the data collected for the period from its commencement through 2004.

The effectiveness of the programme was reviewed by looking at its output and outcome. The number of eligible antenatal women for the programme was 136 052 in the first three years and four months. A total of 132 333 HIV antibody tests were performed and 28 were tested HIV positive, giving an average annual prevalence rate of 0.02% (range, 0.01% to 0.05%). Ten women opted for termination of pregnancy and fourteen courses of antiretroviral therapy were prescribed. Fifteen babies were eventually born in Hong Kong and so far one HIV positive baby was documented (the mother of this infected baby presented late in labour without HIV status diagnosed and thus missed the opportunity for prompt intervention). Taking a natural transmission rate of 25% and assuming 4 lost-to-follow-up babies were uninfected, six of seven HIV infections have been avoided.

The economic impact of the programme was examined by cost-effectiveness analysis (CEA). The predicted incremental cost of universal screening were estimated and compared with the incremental benefit. The incremental cost for the first three years' implementation of the programme was HK$ 11 027 988. A total of six perinatal HIV infections was avoided, yielding a total gain of 154.59 discounted life-years in them and the infected mothers (because of early HIV diagnosis). If each discounted life-year gained was valued to be twice the median per capital annual income (i.e. HK$ 372 534), the incremental benefit of the programme was HK$ 57 590 031, which was five times greater than the incremental cost. The cost per HIV infection averted and cost per discounted-life years gained was HK$ 1 837 998 and HK$ 71 337 respectively.

The programme was largely effective, as reflected from broad coverage of the testing programme (over 97% of acceptance rate in eligible women), identification of HIV positive pregnancies which would otherwise been missed if no screening programme

was in place, high percentage of infected women and newborns received the preventive intervention, and low perinatal HIV transmission rate. The programme is also efficient, as the incremental benefit is much greater than the incremental cost of implementing UAT programme in Hong Kong.

In view of the low HIV prevalence among antenatal women in Hong Kong, high rates of HIV testing and uptake of antiretroviral prophylaxis are a must to the success of the programme. Measures to close the gap of missed opportunities to intervene HIV positive pregnancies are necessary and should be explored, including up-keeping a low opt-out rate, improving turn around time of HIV test checked close to delivery, applying rapid test and acting promptly for positive HIV result.

BACKGROUND

1. The World Health Organization estimated that in 2004, five million people worldwide were newly infected with HIV. Approximately 800 000 of which were children and more than 90% were perinatal infections from mother to child transmission (MTCT).[1,2] The landmark study, AIDS Clinical Trials Group (ACTG) 076, had shown that the full 3-part (i.e. antepartum, intrapartum and postnatal) zidovudine (AZT) prophylaxis placing on HIV infected pregnant women and their newborns effectively reduces mother-to-child transmission rate by two third.[3] Results of this and other researches led to the establishment of recommendations for universal antenatal HIV screening in US and UK during the respective years of 1995,[4] and 1999.[5]

2. In order to prevent newborns from contracting HIV through their infected mothers, Hong Kong, like many other developed countries in the world, has adopted and started universal antenatal HIV testing (UAT) programme since September 2001. Every pregnant woman who attends public antenatal services would be provided with a voluntary HIV antibody testing using an opt-out approach. The programme is supported by the provision of information, education and counseling in antenatal clinics operated by the Department of Health (DH) and the Hospital Authority (HA). For the HIV positive pregnant women, medical and obstetrical care would be offered, taking reference of the recommendations on the prevention of perinatal HIV transmission laid down by the Scientific Committee on AIDS (SCA) in 2001.[6] A report on the implementation of the programme was produced by the SCA in November 2003.[7]

3. Monitoring and evaluation are integral components of a public health programme, to inform the strengths and weaknesses for achieving continual success and improvement. After three years of implementation of the UAT programme, it is high time to have a review. This Report serves to evaluate the effectiveness and efficiency of the UAT programme, based on the data collected for the period from 1 September 2001 to 31 December 2004.

4. To evaluate the effectiveness of the programme, we adopted the Donabedian approach, looking at structure, process and outcomes.[8] The programme structure is represented by the number and attributes of service personnel, the equipment used and administrative arrangements (details were described in a separate report[7]). The process relates to how things are organized and done. Programme coverage (i.e. the

proportion of eligible women who have HIV antibody testing) is an important process measure for the UAT programme. Finally, outcome is concerned with the impact of health services on individuals and communities. In this review, the extent to which the programme reduces the number of HIV positive children is assessed. In addition to these measures, the second part of evaluation is to assess the efficiency of the programme through a cost-effectiveness (i.e. cost per outcome) analysis.

PART I: EFFECTIVENESS OF THE PROGRAMME

Materials

5. To review the effectiveness of the universal antenatal HIV testing programme, two types of information were retrieved from the databases maintained by the Special Preventive Programme (SPP) of Centre for Health Protection, DH. They are: (a) aggregate statistics on the process and outcome, and (b) case-based statistics on HIV positive pregnancy as arising from the UAT (Appendix). The former refers to the workload statistics generated by service providers, including clinical units (Maternal & Child Health Centre (MCHC) of DH and obstetrical units of HA), and laboratories. It comprises data such as the number of antenatal mothers, HIV testing, deliveries and termination of pregnancy. The latter collects data on positive mothers and their babies, including demographic characteristics, HIV disease, antiretroviral prophylaxis to prevent MTCT, medical information and HIV status of the babies. Regular inputs are provided from various stakeholders, including Obstetrics and Paediatrics units of HA, medical units managing HIV positive patients and also private hospitals.

Results

Process indicators

6. Assessment of the quality of service based on the process approach can be wide-ranging. In this study, the workload statistics and the coverage of the programme were employed as the process indicators.

Workload statistics (table 1)

7. The term “eligible women” refers to pregnant women attending the public services between September 2001 and December 2004. The total number of eligible

women for routine HIV testing in public services was 136 052, of which 50 068 were first seen in MCHC and 85 984 in HA obstetric units. An estimated 95% of eligible women attended the education programmes or read the materials provided in the clinics.[9] During the corresponding period, 160 878 deliveries were recorded, of which 122 406 (76%) were from HA hospitals and 38 472 (24%) from the private hospitals.

8. The total number of HIV infected pregnant women detected after three years' implementation of the programme was 28, giving an average prevalence rate of 0.02% (yearly prevalence rate 0.01% to 0.05%). All HIV positive pregnant women were under the care of the HA obstetrical units and the respective medical units of the hospitals or the SPP of DH except those who were lost to follow up. Fourteen courses of antiretroviral therapy (ART) were prescribed and ten women opted for termination of pregnancy. Fifteen babies were eventually born in Hong Kong and so far one HIV positive baby was documented.

9. The total number HIV antibody tests performed was 132 333. The discrepancy between the number of laboratory tests performed (i.e. 132 333) and the number of eligible women (i.e. 136 052) was accounted by the proportion who had opted-out.

Table 1. Caseload, number of HIV testing, HIV prevalence in antenatal mothers and resource support.

	2001 (Sep – Dec)	2002	2003	2004
A1. Client caseload in the public service				
(A) No. of eligible women for routine HIV screening in HA hospitals	8543	26243	23131	28067
(B) No. of eligible women for routine HIV screening in FHS	4 880	16 887	14 402	13 899
(C) Total no. of eligible women for routine HIV screening	13 423	43 130	37 533	41 966
A2. No. of HIV tests performed				
(A) Tests done by DH	4 825	16 804	14 362	13 882
(B) Tests done by HA	8 140	25 128	22 004	27 188
(C) Total tests	12 965	41 932	36 366	41 070
A3. HIV positive pregnancies				
(A) No. managed in the public services	7	9	6	6
(B) No. of courses of ART prescribed	3	5	3	3
A4. HIV prevalence in antenatal mothers (%) (i.e. no. of HIV + preg / total no. of HIV test done in public service)	0.05	0.02	0.02	0.01
A5. Education and training support				

(A) No. of training sessions through RRC	63	0	0	0
(B) No. of HCW participating in training	3 278	0	0	0
(C) No. of education materials distributed				
Posters	5 014	9	101	50
Leaflets	85 983	32 254	16 050	15 130
VCD/ videos	3 544	7	7	2
Manual/ Guidelines	546	13	6	0

Coverage of the programme (table 2)

10. The coverage of the programme was assessed by two indicators: the opt-out percentage and the percentage of women who had their HIV antibody results available when they were in labour in the delivery rooms of hospitals.

11. The opt-out rate of the eligible women at the public antenatal services is a useful indicator in assessing the coverage of the programme. The yearly opt-out rate in public services (DH and HA) decreased from 3.4% in 2001 to 2.1% in 2004. A very low opt-out rate was achieved in 2004, which reflected a high level of acceptance of HIV testing. However, opt-out rate of eligible women was not collected from the private sector.

12. Another method to assess the coverage of the programme is to measure the percentage of women who had their HIV testing result available during delivery. This percentage increased from 16.3% in 2001 to 91% in 2003 in public hospitals. However, paradoxically, it dropped to 86% in 2004. That means around 5240 expectant mothers in 2004 did not have their HIV results available in delivery rooms as compared to 3196 in 2003. As the acceptance rate of HIV testing among the eligible women was nearly 98% in 2004, the discrepancy was most probably due to late presentation in some women, leading to the omission of the antenatal routines (including HIV testing) before delivery.

13. In private sector, the percentage of deliveries with HIV tests performed improved over the years. It is noted that the initial coverage rate was similar between private (15% in 2001) and public services (16% in 2001). Albeit with a slower pick up rate than public hospitals, a continual rising trend was observed in private sector over time, reaching to nearly 80% in 2004. Although the private sector did not form part of the programme, their statistics provide useful data for comparison.

Table 2. Key indicators to show the coverage of the programme.

	2001 (Sep to Dec)	2002	2003	2004
B1. Opt out rate in public service, (%)	3.4	2.8	3.1	2.1
B2. No. (%) of deliveries with HIV status known				
(A) HA hospitals	2 065 (16.3)	30 534 (82.5)	32 139 (91)	32 147 (86)
(B) Private hospitals	592 (14.8)	5 391 (49.1)	8 256 (71.9)	9531 (79.5)
(C) All	2 657 (15.9)	35 925 (74.8)	40 395 (86.3)	41 678 (84.4)

Outcome of the programme

14. In determining the outcome of the programme, a series of indicators have been constructed from the collected data. The key indicators are related to the number of HIV positive pregnancies identified, application of preventive intervention before, during and after delivery, and HIV infection in babies born to the infected mothers.

HIV positive pregnancies identified (table 3)

15. Twenty eight women, aged 21 to 35 (mean 29) years, were identified as HIV positive during the period, which corresponded to 2.12/ 10 000 tests (0.021%). Three of them were known HIV infected before the antenatal testing. The remaining were diagnosed HIV positive before 23 weeks of gestation except one who presented shortly before labour and her HIV status was only clarified after giving birth to the baby. None had AIDS or HIV-related symptoms at the time the infection was discovered.

16. For the probable route of transmission, twenty three women were infected via heterosexual contact and one was infected through injecting drug use, whereas the transmission route for the remaining four cases could not be ascertained. Two mothers had complication from the pregnancy; one had gestational diabetes and the other had placenta praevia, antepartum hemorrhage and postpartum hemorrhage. These were likely not contributed by HIV infection.

Table 3. Demography of 28 positive mothers detected from the UAT programme from September 2001 to December 2004.

	N=28
C1. Ethnicity	
Chinese	10
Thai	6
Nepal	2
Indian	2
Indonesian	1
Filipino	1
African	1
Not mentioned	5
C2. Route of transmission	
Heterosexual	23
Injecting drug use	1
Unknown	4

MTCT interventions before and during pregnancy (table 4)

17. As most of expectant women presented in the second trimester, early institution of preventive intervention was allowed. Of the twenty seven HIV positive women at the antenatal care units who could make informed decisions about their pregnancy, fourteen continued with their pregnancies, ten elected to undergo termination of pregnancy (TOP) after counseling, and the rest three were lost to follow up. Those women who opted continuation of pregnancy were started on zidovudine (AZT) or combination antiretroviral prophylaxis for a period of 6 to 30 (median 16) weeks soon after the diagnosis of HIV and received intrapartum AZT during delivery. All these fourteen women received intrapartum AZT and delivered their babies through Caesarean section.

18. The pregnant woman who presented shortly before labour had her baby delivered by vaginal delivery at 38th week of gestation. No prenatal antiretroviral intervention was given as her HIV status was not known until after delivery. Otherwise, no additional obstetric risk factor for maternal-child transmission was identified in this case, e.g. chorioamionitis, prolonged rupture of membrane, intrapartum procedures performed during delivery.[10]

Table 4. Outcome of pregnancies and ART intervention in 28 HIV positive mothers

	2001 (Sep to Dec)	2002	2003	2004
D1. Outcome of pregnancies				
(A) Termination of pregnancy	3	3	3	1
(B) Delivered by Caesarean Section	3	5	3	3
(C) Delivered by Vaginal delivery	1	0	0	0
(D) Loss to follow-up	0	1*	0	2*
(E) Total	7	9	6	6
D2. ART prescription, number (%)				
(A) ART prescription in known delivered pregnancies	3 (75%)	5 (100%)	3 (100%)	3 (100%)
(B) 3 part ART	3 (75%)	5 (100%)	3 (100%)	2 (66.7%)**
(C) Antenatal only	3 (75%)	5 (100%)	3 (100%)	3 (100%)
(D) Intrapartum and neonatal only	0	0	0	0
(D) Neonatal only	0	0	0	0
D3. % HIV + pregnancies treated with full 3-part ART (excluding TOP cases)	75 (3/4)	83 (5/6)	100 (3/3)	40 (2/5)

* 3 infected mothers lost to follow up before delivery

** 1 infected mother lost to follow up after delivery, so that her baby missed the neonatal ART prophylaxis

Newborns medical condition and neonatal prophylaxis (table 5)

19. Fifteen babies were eventually born in the public services of Hong Kong; all of them had satisfactory clinical conditions. Thirteen babies and their infected mothers were either followed up by HA hospitals or SPP of DH. One mother together with her baby were lost to follow up. The remaining mother and her baby had defaulted soon after the birth and later reattended the pediatric unit of HA when the infant was eight months of age. (This mother was the one who had presented late in labour without HIV diagnosis made and missed the opportunity for prenatal and perinatal interventions.)

20. ART prophylaxis was given to all the thirteen being followed up infants right after birth for a period of 1 to 8 (median 6) weeks. For the adverse effects of the treatment, two children have anemia, one had neutropenia and one had tonic convulsion (may or may not be related). All these side effects were transient and did not recur. The remaining children were well with no adverse effect recorded.

HIV status of the children (table 5)

21. According to the 'Recommendations on the management of HIV infection in infants and children',[11] it is recommended that infants born to HIV positive mothers should have blood check at 48 hours, 1 to 2 months and also 3 to 6 months after birth for ruling out the diagnosis of HIV infection via the HIV RNA PCR test. In addition, HIV antibody test should be determined when the infant is 18 months old. Infants with at least one positive HIV PCR test performed at or after 1 month of age, or with positive HIV antibody test at 18 months of age are classified as HIV infected.

22. Nine babies were confirmed to be HIV negative either by serological test performed at 18 months of age or by two or more negative PCR RNA results. Four babies' HIV status were still pending but they had at least one PCR result postnatally at the time of writing and all were negative. The baby who was delivered in 2001 by vaginal delivery and without ART prophylaxis given was found to be HIV infected. The diagnosis was made by positive RNA PCR test at eight months of age. The baby and her mother were followed up by the Paediatric and Medical units of HA. The four babies born in 2003 and 2004 with pending HIV status had received full 3-part antiretroviral prophylaxis and are most likely not infected. Assuming that natural vertical HIV transmission rate was 25%, six (if the 4 lost to follow-up mothers/babies were assumed uninfected) of seven HIV infections had been avoided.

Table 5. ART interventions and HIV status of the newborns

	2001 (Sep to Dec)	2002	2003	2004
E1. No. of babies born from the infected mothers	4	5	3	3
(A) No. managed in the public services	4	5	3	2
(B) Number and percentage (%) of ART prescription in neonatal period	3 (75%)	5 (100%)	3 (100%)	2 (66.7%)
E2. HIV status of babies born				
(A) Negative	3	5	1	0
(B) Positive	1	0	0	0
(C) Pending	0	0	2	2
(D) Unknown	0	0	0	1*
E3. % HIV + pregnancies leading to the birth of an HIV infected baby	14.3 (1/7)	0	0 (tentative)	0 (tentative)

*1 baby and her infected mother were lost to follow up after delivery

Partner counselling and referral

23. Apart from the prevention of perinatal infection, the universal HIV testing programme also serves to detect otherwise unknown cases of infection in the family (secondary case finding) through partner counselling and referral services. Partner counselling by patient referral was conducted for all the sero-positive pregnant women. A total of twenty two male partners and twelve children that were born in previous pregnancies had the HIV antibody testing done, and eleven male partners and one child amongst them were found to be HIV positive. All of them were referred to obtaining care for their HIV infection after diagnosis.

PART II: EFFICIENCY OF THE PROGRAMME – COST-EFFECTIVENESS ANALYSIS

24. For a comprehensive public health programme, cost analysis is crucial to determine the effectiveness of the strategy from an economic point of view. In the second part of this Report, economic impact of the UAT programme in the perspective of Hong Kong society was assessed. Cost-effectiveness analysis (CEA) was used in this evaluation. CEA was concerned with the measurement of outcomes in natural units (e.g. cost per event prevented).[12] In this study, the primary endpoints examined were the cost per HIV infection avoided and the cost per life-year gained. Local data gathered were used when available, whereas overseas reference parameters and values were factored in as necessary.

Methodology

Perspective

25. Both government perspective and societal perspective was included in this cost-effectiveness analysis. In the government perspective, all the costs spent and saved by the government, including direct costs associated with HIV voluntary counseling and testing, the costs associated with MTCT interventions, the additional treatment costs of mothers and babies due to earlier diagnosis and the lifetime medical costs of HIV positive infants saved was included. In the societal perspective, in addition to the above direct costs, indirect cost such as the number of HIV infection avoided and the number of life-years gained was also included in the calculation. An overview of the perspective and parameters is at table 6. Details of the model and its components are depicted below.

Table 6. Parameters used in the cost-effectiveness analysis model for estimate of cost and benefit of UAT programme in Hong Kong

	*Cost	*Saving	Benefit
Direct			
Mother			
Information delivery, HIV screening and antibody test	√		
Termination of pregnancy, Caesarean section	√		
Antenatal and intrapartum antiretroviral prophylaxis	√		
Care arising from earlier HIV diagnosis	√		
Baby			
Neonatal antiretroviral prophylaxis	√		
Care arising from earlier HIV diagnosis	√		
Life-time medical cost of HIV infected who are diagnosed only when symptomatic		√	
Indirect			
Number of HIV infection avoided			√
Number of life years gained – mother and children			√

*net cost = cost - saving

Overview of the model

26. The predicted incremental cost of universal screening were estimated and compared with the incremental benefit. The intervention was considered to be cost-effective when (a) the incremental cost was less than or equal to the monetary valuation of incremental benefit and (b) the cost per discounted life-years gained was less than twice the median per capital annual income, a figure shown in theoretical model to result in efficient allocation of resources.[13] Moreover, cost per HIV infection averted was estimated for completeness sake. The model was evaluated for a 3-year-and-four-months cohort (1 September 2001 to 31 December 2004) of pregnant women and it included all future cost and benefit. Both the future costs and benefits were discounted at the rate of 3.6%, a value used by the Census & Statistical Department of the Government of Hong Kong in 2005. Uncertainty and impact of the extent of variation of key variables on the estimates was assessed by sensitivity analyses. All values of the cost variables were reported in Hong Kong dollars and reflect 2004/ 2005 prices. The average exchange rate for one Hong Kong dollar ($) to British pound (£) during that time period was 0.07048.[14]

Mother-to-child transmission interventions

27. At the first contact with a health-care professional, every pregnant woman is supplied with an information leaflet about the risks of HIV infection and the advantages and disadvantages of the universal screening programme. At the antenatal health talk, the expectant mothers are explained about the antenatal routine blood tests, including HIV. They are informed the right to opt out any of the antenatal tests. For those who accepted HIV testing as part of their antenatal health screening investigations, blood for the test will also be collected. The standard HIV laboratory testing of screening by enzyme linked immunosorbent assay (ELISA) followed by confirmation with western blot is done. A majority of the laboratory tests, especially for the confirmation part, is done by the Government Virus Unit. Negative test results will be reviewed to the clients together with other blood results. Clients with HIV positive results will be called back for counseling and appropriate referrals.

28. Pros and cons of continuing with the pregnancy will be explained to the infected mother. A proportion of which may choose to terminate the pregnancy. Those who opted for continuation of pregnancy are assessed for antiretroviral therapy by the attending physician. Whether the maternal HIV disease status requires treatment is one factor affecting the choice of antiretroviral regimen. Obstetricians often plan for delivery by elective Caesarean section, during which time intrapartum zidovudine is given. After delivery, they continue to receive appropriate medical treatment and care. The infants that are born of the infected mothers receive antiretroviral therapy (AZT) for six weeks to further reduce the risk of mother-to-child transmission.

Intervention costs

29. As mentioned above, the direct intervention cost was divided into two components: (a) cost associated with HIV information delivery, HIV screening and antibody test services for pregnant women who attended the public antenatal services and (b) cost associated with the MTCT interventions.

Laboratory test for HIV antibody

30. There were a total of 132 333 HIV antibody testing performed throughout the period. According to the information provided from Government Virus Unit, the average cost for a HIV antibody test was around HK$ 100. This figure included both the reagent costs and the staff salary.

Production of public education materials

31. The implementation of universal antenatal HIV testing programme required the development of new education resource materials (mainly video, leaflets and posters), training manual for staff, and the organization of training. It was estimated that around HK$ 500 000 was spent to produce the education resource materials in the first year, and thereafter the costs were absorbed in the regular budget.[7]

HIV information delivery and counselling

32. HIV information delivery was conducted in groups and was incorporated in the existing antenatal health talk series for the expectant mothers. Conventional HIV pre-test counseling is not necessary for the UAT programme in line with international development and its incorporation as part of the antenatal health screening. For those women who are confirmed HIV positive, more elaborate post-test counselling is offered by the nurse counselors and medical staff of HIV clinical services of DH or HA. As no additional resources was incurred to employ new medical and nursing staff, therefore, the cost for the information delivery and counselling can be assumed to be absorbed into the regular budget.

ART prophylaxis regimen and its cost

33. The treatment regimen, which has been used to prevent perinatal HIV transmission in ACTG 076 protocol[3] and recommended by the SCA in 2001,[6] consists of three phases of therapy. In the first phase, HIV-positive pregnant woman was started on either AZT monotherapy (300mg bid) or AZT and lamivudine combination therapy (300mg bid + 3TC 150mg bid) on an outpatient basis at 14 weeks of gestation and continue until the onset of labour. In some cases, highly active antiretroviral therapy (HAART) (e.g. AZT 300mg bid + 3TC 150mg bid + IDV 800mg tds) is prescribed to the pregnant women for better viral suppression. In the second phase, intravenous AZT is given during labour as a loading dose of 2mg/kg of body weight, followed by a continuous infusion of 1 mg/kg of body weight per hour until delivery. In the final phase, newborn infant is treated orally with syrup AZT at 2mg/kg of body weight every 6 hours, beginning 8 to 12 hours after birth and continued for 6 weeks.

34. The total drug-acquisition costs for antiretroviral therapy per treated case under the ACTG 076 regimen (including all phases of treatment) were calculated using the information from the pharmaceutical service of Department of Health.[15] Acquisition

costs for antiretroviral therapy were based on mid-range estimates of point of initiation of prenatal treatment, i.e. 25 weeks' gestation (range, 10 to 34 weeks), as well as the midrange estimates of maternal weight (55 kilograms), length of labour (6 hours) and the average infant weight over the 6-week treatment period (5 kilograms). Additional costs relating to management of drug adverse effects, which are uncommon because of the limited treatment duration, were not included in this analysis.

35. A total of fourteen HIV infected pregnant women received antenatal ART prophylaxis. Most of them (11 out of 14) received HARRT, two of them received monotherapy and the remaining one received 2-drug combination therapy.

Additional treatment costs for HIV-infected women and newborns due to early diagnosis

36. The additional treatment cost for a HIV-infected woman and her newborn due to early diagnosis and treatment was HK$ 36 180 and HK$ 100 500 respectively. The calculation was based on the assumptions that without the UAT programme, all infected women would have their HIV status diagnosed 18 months (ranges from 12 to 24 months) after delivery[16] and all infected newborns would be diagnosed within 50 months of birth (ranges from 32 to 78 months).[17] It was also assumed that each HIV-infected woman and child needed an outpatient visit, CD4/CD8 T lymphocyte subset tests as well as virus load determination every two months. No antiretroviral therapy was assumed to commence within this period.

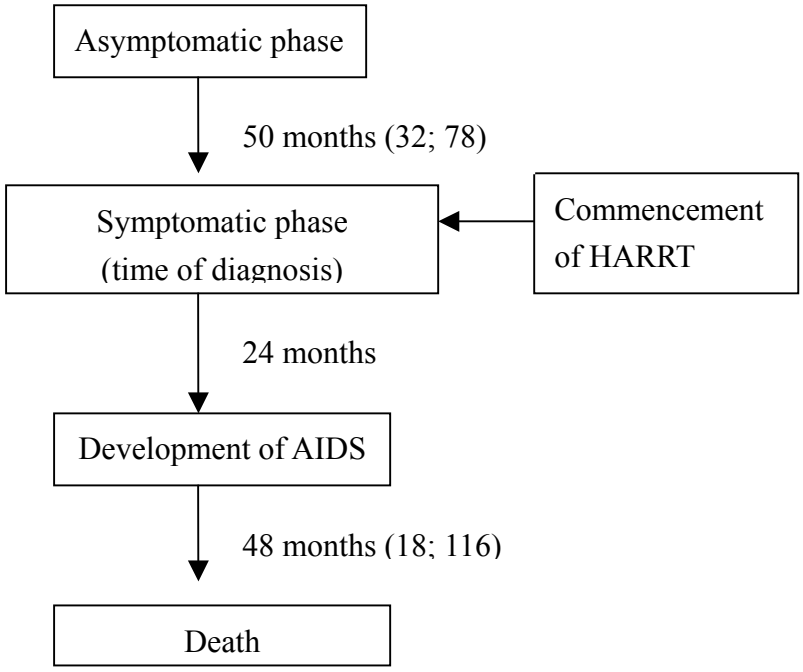
Further analysis of net cost: potential savings of lifetime medical cost for HIV-infected infants if without UAT programme

37. In order to estimate net cost per each life-year gained, all potential savings were deducted from the gross cost to obtain the net cost. Therefore, the cost savings from an avoided case of vertically-transmitted HIV infection (i.e. the lifetime costs of treatment for a child born with HIV) were deducted from the costs of screening, MTCT intervention and care of mother and infant from earlier diagnosis (table 6).

38. An estimate of total lifetime medical cost for an HIV-infected children who is diagnosed at symptomatic phase was obtained by multiplying phase-specific annual costs by the estimated average duration of the phase, and summing up all the three phases (i.e. asymptomatic, symptomatic and AIDS phase). Because of the small

number of cases in Hong Kong, phase duration estimates were based on data in the international literature. According to a study which models the cost of paediatric HIV infection[17], for children born to mothers whose HIV status were unknown at child's birth (i.e. unscreened population), the mean total survival of the children with antiretroviral therapy initiated at onset of symptoms was 122 months (ranges from 74 to 218 months), with mean length of AIDS phase and of asymptomatic phase taken to be 48 months (ranges from 18 to 116 months) and 50 months (ranges from 32 to 78 months) respectively. The state transition diagram is shown in Figure 1.

Figure 1. Diagrammatic representation of the estimates of life expectancy and AIDS-free life expectancy when antiretroviral therapy was commenced at the time when symptoms develop.



39. The annual charges for health care services needed to manage a HIV-infected child included outpatient visits, hospital stays, laboratory investigations as well as HIV-related drugs prescription. The Paediatric unit of Queen Mary Hospital was the major centre providing tertiary care to children with HIV infection in Hong Kong; therefore information on the management of paediatric HIV infection was referenced from the experience of this centre. It was assumed that each HIV-infected child requires an outpatient visit, CD4/CD8 T lymphocyte subset tests as well as virus load determination every three months. Antiretroviral therapy (HAART) was commenced when the child started to have symptoms (i.e. the time when the HIV status of the child was discovered) and continued till death. Hospital admission was needed twice

per year (7 days for each episode) after the development of AIDS and primary prophylaxis on opportunistic infection (mainly *Pneumocystis carinii* pneumonia) was routinely offered to the children in the AIDS phase or when there is moderate to severe immunosuppression. The annual costs for HIV-infected child and the estimated average duration of the phases are shown in table 7.

Table 7. Annual and lifetime medical costs for perinatally infected children

Year of life	Symptoms by age in months	Undiscounted costs	Discounted costs
1 (phase 1)	1 to 12: Asymptomatic	NA	NA
2	13 to 24: Asymptomatic	NA	NA
3	25 to 36: Asymptomatic	NA	NA
4	37 to 48: Asymptomatic	NA	NA
5 (phase 2)	49 to 50: Asymptomatic 51 to 60: Symptoms develop (time of HIV diagnosis)	NA HK$ 83 601	NA HK$ 80 591
6	61 to 72: Symptomatic disease	HK$ 100 322	HK$ 96 710
7 (phase 3)	73 to 74: Symptomatic disease 75 to 84: AIDS	HK$ 16 720 HK$ 122 101	HK$ 16 118 HK$ 117 705
8	85 to 96: AIDS	HK$ 146 522	HK$ 141 247
9	97 to 108: AIDS	HK$ 146 522	HK$ 141 247
10	108 to 120: AIDS	HK$ 146 522	HK$ 141 247
11	121 to 122: AIDS→death	HK$ 24 420	HK$ 23 540
Total		**HK$ 786 730**	**HK$ 758 405**

Identification of incremental benefits

40. The incremental benefits of the programme were determined by the total life-years gained. It was reflected by the increase in life expectancy for the infants in whom HIV infection were avoided. To predict the likely number of cases of HIV infection avoided, the observed rate of transmission with intervention was compared to the estimated rate of HIV transmission without intervention. The net life-years gained also included gain in the life expectancy of HIV positive mothers and babies (who still contract HIV despite optimal interventions) from earlier diagnosis and appropriate undelayed treatment.

41. Several assumptions have to be made in the calculation of total life-years gained. Assuming the life expectancy of HIV negative infants were 79 years and HIV positive ones were 10 years, then nearly seventy life years were gained if one HIV infection was averted.[17] If 3.6 percent discounting rate was used to discount the future benefit, then 22.72 discounted life-years were obtained. A gain of 1 year and 1.27 years were assumed to reflect the health benefit for HIV positive mothers and infants of starting

antiretroviral treatment earlier.[16] This analysis also assumed that antiretroviral drug treatment causes no adverse effects to the health of uninfected infants.[18]

Data sources

42. The values for variables included in the model are listed in table 8. The favorable and unfavorable values included for each variable allow the model to be evaluated for alternative scenarios.

Table 8. Values for variables that are included in the cost-effectiveness model

Variables	Values/ Unit cost HK $ (favorable; unfavorable)	Source
Epidemiological parameters		
Accept screening (%)	97 (100; 80)	Special Preventive Programme, Department of Health [19]
Programme coverage (%)	85 (100; 70)	
Prevalence of HIV (%)	0.02 (0.01; 0.05)	
Universal HIV antibody testing and counselling service		
HIV antibody test (include staff and reagent cost)	HK$ 100	Government Virus Unit, Department of Health
Investment in educational materials and training of staff	HK$ 500 000	Report on the implementation of the UAT programme in public services[7]
Pretest counseling	No extra cost incurred	
Posttest counseling for true positive result	No extra cost incurred	
Intervention to reduce risk of vertical transmission		
Termination of pregnancy	HK$ 15 850 (HK$12 300; HK$19 400)	Hong Kong Gazette 2003 [20]
Caesarean section	HK$ 34 600 (HK$31 100; HK$38 100)	
ART prophylaxis		
Antepartum		
AZT	HK$ 14.7/ 100mg	Drug Formulary 2005, Department of Health[15]
3TC	HK$ 32.1/ 150mg	
IDV	HK$ 16.3/ 400mg	
NFV	HK$ 10.93/ 250mg	
Intrapartum & Postpartum AZT (syrup)	HK$ 4.66/ 1mg	Interview with Pharmaceutical company
Unit cost for outpatient and hospital service		
Outpatient consultation (per session)	HK$ 1 910	Hong Kong Gazette 2003[21] and Government

CD4/CD8 T lymphocyte subset test	HK$ 1 010	Virus Unit
Virus load determination	HK$ 1 100	
Hospital admission (per day)	HK$ 3 300	
Capital GDP		
Median per capital GDP	HK$ 186 267	Census and Statistics Department[22]

Results

Incremental cost

43. The additional costs of the UAT programme for the first three years were HK$ 13 233 300 for the HIV antibody tests, HK$ 500 000 for training health-care professionals and producing health education materials, HK$ 1 129 558 for the treatment of preventing perinatal infection (including the cost for perinatal ART prophylaxis for the women and the infants, the cost for additional Caesarean section and the cost for termination of pregnancy) and HK$ 715 560 for the medical treatment of the infected mothers and newborns due to earlier diagnosis through the UAT programme. The costs were offset by saving HK$ 4 550 430 from the life-time HIV care of infected newborns. Therefore, the total incremental cost of the UAT programme for the first three years' implementation was HK$ 11 027 988. The results and the breakdown of the costs are shown in table 9.

Table 9. Incremental cost and saving estimate, based on the 28 positive mothers identified from 2001 to 2004

HIV information delivery, screening and antibody test	
(a) Number of HIV antibody test performed	132 333
Cost	HK$ 13 233 300
(b) Training health-care professionals and producing health education materials	HK$ 500 000
Subtotal cost (a+b)	**HK$13 733 300**
MTCT interventions	
(c) Number of abortion performed	11
Cost	HK$ 174 350
(d) Number of Caesarean section performed	14
Cost	HK$ 484 400
ART prophylaxis	
(e) Number of women receiving ART during pregnancy	14
Cost	HK$ 343 915
(f) Number of women receiving ART during labour and delivery	14

Cost	HK$ 25 116
(g) Number of newborns receiving neonatal ART prophylaxis	13
Cost	HK$ 101 777
Subtotal cost (c+d+e+f+g)	**HK$ 1 129 558**
Care arising from earlier HIV diagnosis	
Number of HIV positive mothers/children under the care of public sectors	17/1
(h) Incremental treatment cost of HIV-pregnant women due to early diagnosis and treatment	HK$ 615 060
(i) Incremental treatment cost of HIV infected newborn due to early diagnosis and treatment	HK$ 100 500
Subtotal cost (h+i)	**HK$ 715 560**
All additional cost (a+b+c+d+e+f+g+h+i)	**HK$ 15 578 418**
Life-time medical cost of HIV-infected children	
Number of HIV positive infants avoided[A]	6
(j) Saving of lifetime cost of HIV infected children	HK$ 4 550 430
All saving (j)	**HK$ 4 550 430**
Total incremental cost = all additional cost minus all saving	**HK$ 11 027 988**

Note A: Assume the perinatal HIV transmission rate was 25% [3]

Incremental benefit

44. For the incremental benefit, assuming that HIV vertical transmission rate was 25%,[3] it was estimated that seven newborns of the 28 positive pregnancies would have been infected with HIV without the UAT programme. On the other hand, after implementing universal screening programme and its interventions, there was only one baby found to be HIV infected among the 28 HIV positive pregnancies, and infection in the rest six infants (assuming those unknown and defaulted cases were not infected, see sensitivity analysis below) were avoided. Thus, implementation of testing programme together with offering appropriate treatment resulted in six avoided cases of HIV infection in babies and a net gain of 136.32 (22.72 x 6) discounted life-years. Furthermore, an additional 18.27 ((1 x 17) + 1.27) discounted life years were gained due to earlier treatment of infected mothers and newborn, yielding a total of 154.59 discounted life-years. For a decision maker willing to pay up to twice the median per capital income (i.e. HK$ 372 534) to gain one life-year, the incremental benefit of the programme was calculated to be HK$ 57 590 031.

Cost-effectiveness result of the 3-year-and-4-months UAT programme cohort

45. As calculated above, the incremental benefit (HK$ 57 590 031) was more than five times greater than the incremental cost ((HK$ 1 129 558) of implementing the UAT programme. The calculated endpoints of cost per HIV infection avoided and cost per discounted life-years gained was HK$ 1 837 998 (HK$ 1 129 558 / 6) and HK$ 71 337 (HK$ 1 129 558 / 154.59) respectively. The cost per life-years gained was much smaller than the median per capital annual income (HK$ 372 534).

Sensitivity analysis

46. The results of the sensitivity analysis are shown in table 10. It was found that cost effectiveness of the programme was sensitive to changes in HIV prevalence of the antenatal population and the coverage of the programme, as reflected by the changes on the cost per HIV infection avoided and the cost per life-years gained. The values for the cost per discounted life-years gained were plotted for plausible ranges of HIV prevalence and the coverage rates of the programme (Fig. 2 & Fig. 3). As the prevalence rate of HIV infection among the antenatal population in Hong Kong was low, adequate coverage of the testing and uptake of interventions which would be translated into real numbers of HIV infection avoided were thus crucial for achieving good cost effectiveness. There are other factors that will affect cost-effectiveness of the programme, including default rate of the expectant mothers, if the benefits (i.e. life-years gained) are not discounted and if lifetime cost of paediatric HIV patients increases with time due to improved treatment and prognosis.

Table 10. Results (cost in HK$) of a change to the values of the key variables

Variables	**Cost per HIV infection avoided** **[change from actual value (%)]**	**Cost per life-year gained** **[change from actual value (%)]**
HIV prevalence of antenatal population (0.01%)	3 920 002 (112)	146 533 (112)
HIV prevalence of antenatal population (0.02%)	1 845 737 (0)	68 979 (0)
HIV prevalence of antenatal population (0.05%)	595 554 (68)	22 255 (68)
% coverage of programme (70%)	2 195 115 (19.4)	82 028 (15)
% coverage of programme (85%)	1 975 667 (0)	73 840 (0)
% coverage of programme (100%)	1 828 309 (0.5)	68 328 (4.2)
% acceptance of programme (70%)	2 181 590 (18.7)	81 517 (14.3)
% acceptance of programme (85%)	1 969 336 (0)	73 587 (0)
% acceptance of programme (100%)	1 820 777 (0.9)	68 036 (4.6)
MTCT rate: 15%	4 109 851 (124)	144 570 (103)
MTCT rate: 30%	1 346 787 (26.7)	53 582 (24.9)
Assume all lost to follow up cases were	7 030 804	220 713

HIV positive [A]	(283)	(209)
Termination of pregnancy (favorable value) [B]	1 831 490 (0.4)	71 084 (0.4)
Termination of pregnancy(unfavorable value) [B]	1 844 506 (0.4)	71 590 (0.4)
Caesarean section (favorable value)	1 829 831 (0.4)	71 020 (0.4)
Caesarean section (unfavorable value)	1 846 165 (0.4)	71 654 (0.4)
Treatment cost for HIV infected newborn (favorable value)	1 803 828 (1.9)	70 010 (1.9)
Treatment cost for HIV infected newborn (unfavorable value)	1 872 168 (1.9)	72 663 (1.9)
Treatment cost for HIV-pregnant women (favorable value)	1 831 968 (0.3)	71 103 (0.3)
Treatment cost for HIV-pregnant women (unfavorable value)	1 847 378 (0.5)	71 701 (0.5)

Footnote A: A total of 4 cases were lost to follow up, 3 before and 1 after delivery.

Footnote B: Favorable and unfavorable values marked in table 7 were applied to the model; the results were compared to the actual values.

Fig. 2 Cost per discounted life-years gained for all HIV prevalence in antenatal population in Hong Kong

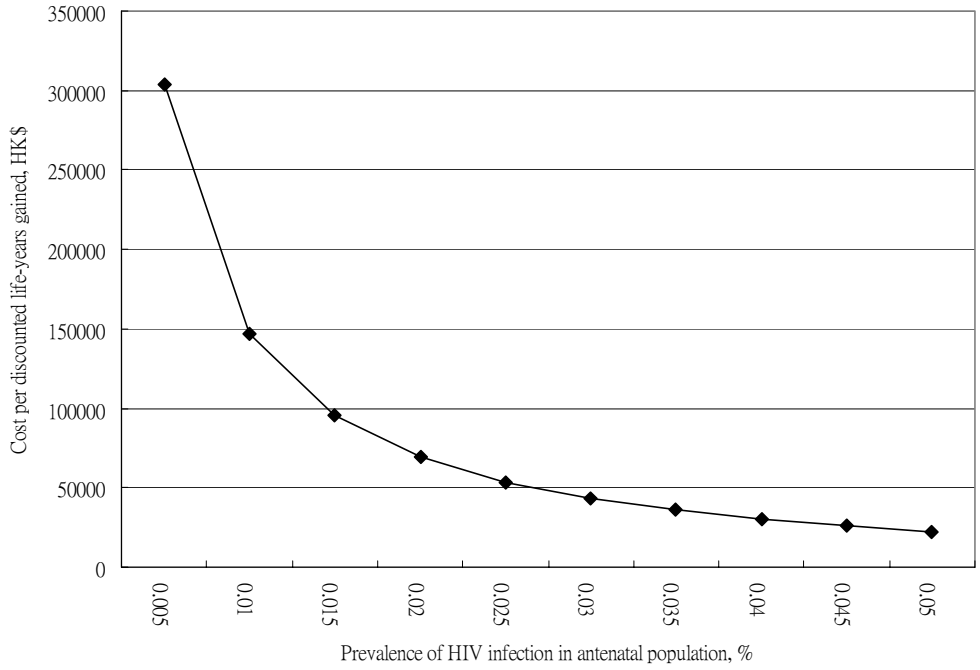
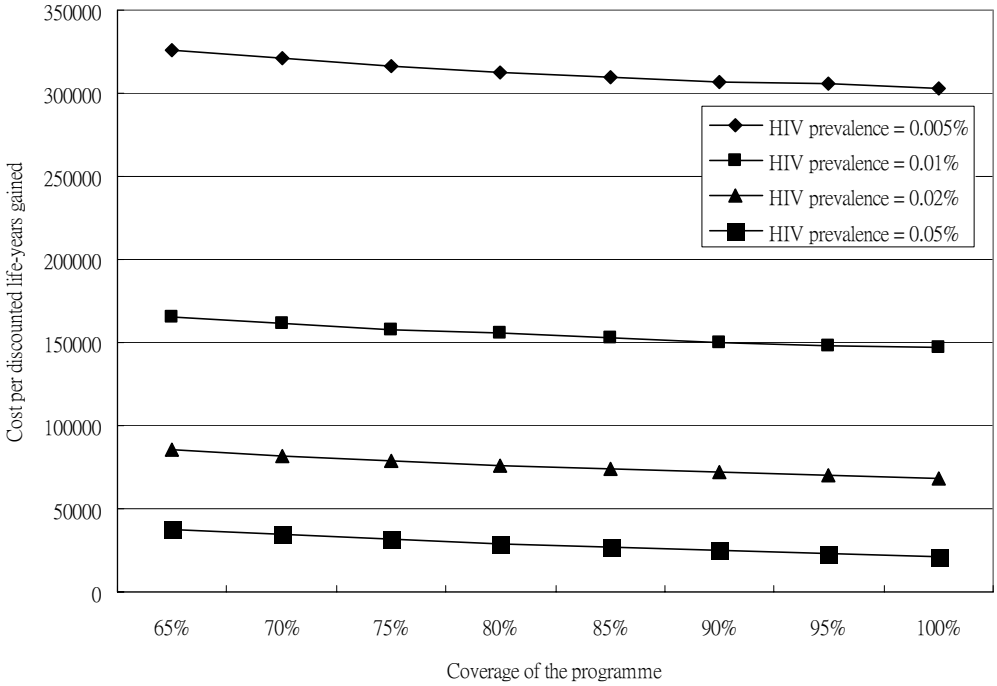


Fig. 3 Cost per discounted life-years gained for different coverage rate of universal antenatal HIV testing programme



DISCUSSION

The UAT programme is largely effective and efficient

47. More than three years since its introduction, the programme has only been possible with the concerted efforts of various stakeholders. The system of obstetric and pediatric coordinators greatly facilitated effective management of mothers and babies for MTCT prevention and their HIV diseases per se. Moreover, the coordinator system permitted tracing of information as maintained in the programme databases pertinent to its monitoring and evaluation.

48. The main objective of the UAT programme is to interrupt mother-to-child HIV transmission in Hong Kong. So far only one baby who was born in 2001 was confirmed HIV infected, and is currently under the care of HA Paediatric unit; infection of some 6 babies had been prevented. Early HIV diagnosis of the 28 positive mothers was achieved, which is unlikely without the programme. There is good coverage of the eligible antenatal women, with an opt out rate of 2-3%. Surveillance of HIV situation among antenatal women is made possible, with continual monitoring

and testing of a majority of the population. In addition, spinout effect was observed with underlying HIV infection in 10 spouse/children retrospectively detected from partner counseling and testing service after the mothers' diagnosis. All in all, information delivery and HIV testing shall also lead to increased HIV awareness among these reproductive age women, who are mostly not HIV infected. From these angles, the UAT programme has been very successful in its last 3 plus years.

49. Besides assessing the effectiveness of the programme, its efficiency is examined by cost-effectiveness analysis. The aim is to provide the health planners and policy makers with concrete and real-life setting information from an economic point of view. Together, these approaches are to comprehensively evaluate the local UAT programme, with a view on how to refine the activities for future improvement. From the CEA, we found that despite a low HIV prevalence, the incremental benefit is much greater than the incremental cost of implementing UAT programme in Hong Kong. There were CEA analyses done in western countries, where similar antenatal testing and mother-to-child transmission programmes are in place.

Comparing with other studies on cost-effectiveness

50. A study of universal antenatal HIV screening in the United Kingdom (UK) found that 6.39 discounted life-years were gained at a net cost of £14 833 (HK$ 210 457) yielding a cost per discounted life-year gained of £2321 (HK$ 32 931).[23] The authors assumed that a discounted life-year gained was worth £10 000 (HK$ 141 884) and concluded that universal screening for preventing perinatal HIV transmission was cost effective, as long as the cost and uptake of the test could be maintained within certain ranges. Another UK study found the cost per discounted life-year gained to be £4000 (HK$ 56 754), which would increase to £20 000 (HK$ 283 768) for areas with comparatively low prevalence rates.[24] A study in the United States on the cost-effectiveness of universal screening revealed similar findings. The authors estimated the cost per discounted life-year gained to be US$ 8 900 (HK$ 69 260) and concluded that the programme was cost-effective if each discounted life-year gained was valued at US$ 50 000 (HK$ 389 100).[25,26] The CEA findings of UAT programme in Hong Kong were similar and compared favourably with those of the developed countries.

51. Comparisons can also be drawn from other health care programmes in Hong Kong and other countries. In a review of the cost-effectiveness of applying the cholesterol and recurrent event (CARE) study protocol in Hong Kong,[27] it was found

that the costs per fatal/ non-fatal cardiac event and stroke prevented were HK$ 1 146 413 and HK$ 2 961 566 respectively; and the net cost per quality adjusted life-year gained was HK$ 65 280. An analysis of the decisions made by the Australian Pharmaceutical Licensing Authorities indicated that policy makers were unlikely to recommend a drug if the cost per life-year gained was greater than Au$ 86 000 (HK$ 509 583) but most often endorsed a drug if the cost per life-year gained was less than Au$ 48 000 (HK$ 284 302).[28] Clearly, the cost per discounted life-year gained for UAT programme as estimated to be HK$ 71 337 would be considered cost-effective.

52. The CEA on universal screening conducted in Australia in 2004 demonstrated that the intervention would be cost-effective if HIV prevalence in the antenatal population was greater than or equal to 0.004372%.[16] In Hong Kong, the prevalence of HIV in antenatal population was around 0.02% annually. Based on this prevalence level of the antenatal population, it was possible to infer that the UAT programme in Hong Kong is cost-effective. However, from the sensitivity analysis, we found that apart from HIV prevalence, the cost-effectiveness estimates are greatly affected by the coverage of HIV testing and subsequent interventions to infected mothers and their babies. While HIV prevalence is not amenable to change, coverage of the programme should be enhanced by human efforts to improve its cost-effectiveness in a low prevalence setting.[16,23,24]

53. In the CEA, there was no attempt to address the human costs of HIV infection such as emotional, psychosocial and other cost burden of infection for the patient as well as the patient's family, especially the infected mother and possibly father as well. It was because many psychological factors cannot be costed easily and thus would be difficult for incorporation into the model. Clearly, reducing the number of HIV-positive infants has more far-reaching effects than simply the potential saving in medical care costs, e.g. the reduction in grief and burden to the family and other caregivers. Also, the indirect costs, such as those associated with orphaned children and years of productivity lost due to illness and premature death were not addressed. Moreover, life-years gained of the infected partners and children because of earlier HIV diagnosis from partner counseling and referral were not included in our model. All these will make the UAT programme even more cost-effective. On the other hand, the model did not address the possibility, if any, of long-term yet unknown detrimental health effects to the children associated with zidovudine and other antiretrovirals.

Gaps to be filled – increase the proportion of mothers with known HIV status and

interventions to positives

54. Taken together, success of the UAT programme in terms of MTCT prevention and its cost-effectiveness hinges largely on (a) HIV prevalence in mothers, (b) detection of HIV positive mothers, which in turn depend on rate of HIV testing before delivery, and (c) timelineness and completeness of antiretroviral prophylaxis. The overall coverage rate of the programme in 2004 was that about 85% of all deliveries had been tested for HIV. In other words, some 15% of mothers did not have their HIV status available for informing appropriate MTCT interventions. There had certainly been improvement of the programme, as reflected by the lowered opt-out rate for eligible women in public services and increased percentage of deliveries with known HIV status in private hospitals. Nevertheless, paradoxically, the deliveries with HIV tests done in public sector dropped from 91% in 2003 to 86% in 2004, viz. a decrease of over 5000 mothers. As the acceptance rate among eligible women was nearly 98% in 2004, these mothers most probably missed HIV tests due to late presentation before or at time of delivery. A better understanding of the portfolio of these missed out mothers in routine antenatal testing and time of delivery can be obtained by including demographic characteristics like ethnicity and Hong Kong residents or not in the regular statistical tracking.

55. Given the well-proven efficacy of antiretroviral and obstetric interventions in reducing MTCT, the missed opportunity for prevention of perinatal infections in Hong Kong is a cause for concern and poses challenges to all involved. It is recognized that in recent years a substantial proportion of mothers delivering in HA hospitals were non-eligible persons who are not local residents, mostly from Mainland China and Asia. They often have no prior antenatal care and present to hospital close to or at time of delivery. As they fall under the prevention of MTCT, to include them for HIV testing and timely act according to the antibody result is necessary. A fast availability of HIV test result appears crucial for this group of mothers who present late, so as to increase the proportion with known HIV status before delivery, and that essential pre-partum, intrapartum and neonatal interventions can be given timely as indicated. Early revelation of HIV diagnosis to the mothers may also enhance her compliance with the necessary interventions and follow-up for her baby.

56. Improving the turn around time of HIV test result may be done by (a) hasten laboratory processing and release of result, and/or (a) rapid HIV testing. HIV rapid test emerges as useful tool in point-of-care settings[29] where immediate decisions can be made based on the preliminary results (often is reactive results that matter). The

US Centers for Disease Control and Prevention (CDC) recommended routine rapid testing (OraQuick Rapid HIV-1 Antibody test) at labour for those women that having unknown HIV status.[30] Evidence from the Mother Infant Rapid Intervention at Delivery (MIRIAD) study conducted by the CDC in 2003 indicated that rapid HIV testing is feasible and could deliver accurate and timely test results for women in labour. It was also proven to be effective in reducing perinatal HIV transmission by offering HIV-positive women and their infant prompt access to intrapartum and neonatal antiretroviral prophylaxis.[31] Management can of course be altered subsequently according to the confirmatory western blot results. For example, antiretroviral prophylaxis can be stopped should mother with reactive rapid test was confirmed HIV negative afterwards; days of antiretroviral exposure do not cause significant adverse effects. The feasibility of introducing rapid HIV test for late presenting mothers in Hong Kong needs to be explored.

57. In view of the low HIV prevalence among antenatal women, high rates of HIV testing and uptake of antiretroviral prophylaxis are a must to the success of the programme. One infected baby would be too many against the small number of positive pregnancies in our locality, as MTCT transmission rate can be as low as <1-2%[32] with full medical interventions to infected mothers and their babies. Locally, although the acceptance rate of the UAT programme had reached over 97% in public sector in 2004, still 15% of deliveries without any HIV testing before labour were recorded. Those mothers who had missed the HIV tests were most probably due to late presentation prior to delivery, and it is expected that some of them are HIV infected. Measures to close the gap of the missed intervention opportunities for these mothers and their babies are deemed necessary and imminent.

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Appendix. Forms for HIV positive pregnancies database

Form A. DEPARTMENT OF HEALTH
HIV/AIDS Report Form

Please read the following instructions:

1. This is a voluntary report form for reporting:
(i) newly diagnosed HIV infection;
(ii) newly diagnosed AIDS;
(iii) change(s) of status of previously diagnosed HIV/AIDS cases
2. Only sections, (A), (C) & (D) need to be completed for reporting HIV infection.
3. All sections, (A), (B), (C) & (D) have to be completed for reporting AIDS or updating information.
4. All individual's information will be treated as strictly confidential and used in global analysis only.
5. Please mark CONFIDENTIAL on the envelope and mail the completed form to:

Consultant Physician
Special Preventive Programmes
Department of Health
5/F Yaumatei Jockey Club Clinic
145 Battery Street, Yaumatei,
Kowloon.

Section (A) Reporting HIV Infection

Your reference code number: _____ (HK resident/non-resident*)
Sex: M/F* Date of birth: (dd/mm/yyyy) _____ or age (at last birthday) _____
For female: Is she pregnant: Yes/No* (complete Box 1 if "Yes")
Ethnicity: Chinese/non-Chinese* (Asian/Caucasian/Black/others, please specify _____)*
Marital status: married/widowed/separated/never married*
Date of laboratory diagnosis in HK (dd/mm/yyyy): _____ Western Blot Confirmation: Yes/No*
Name of Laboratory : _____
Previous HIV positive result outside Hong Kong: No/Yes*
(specify place: _____; date: (dd/mm/yyyy) _____)
Main route of transmission (please tick; if >1, put down 1 & 2 in descending order of the two most likely routes)
_____ sex: (____ heterosexual / ____ homosexual / ____ bisexual)*
_____ transfusion of blood – local/overseas* (specify date : _____)
_____ haemophilia
_____ injecting drug use
_____ perinatal
_____ others; specify _____
_____ not known
CD4 count per u1 (if known): _____ date: (dd/mm/yyyy): _____
HIV status of spouse, if any: unknown/positive/negative*

Box 1

Gravida _____ Para _____

LMP (dd/mm/yyyy) _____

Obstetric follow-up at:

hospital/clinic _____

Expected hospital/place of delivery:

_____

Current plan: Continue pregnancy/

T.O.P*

Section (B) Reporting AIDS

Is this an update of a previously reported HIV + case: Yes/No*
Date of diagnosis: (dd/mm/yyyy) _____
AIDS defining illness(es):
1. _____ clinical Dx/pathological Dx*
2. _____ clinical Dx/pathological Dx*
3. _____ clinical Dx/pathological Dx*
CD4 count per u1 (if known): _____ Date: (dd/mm/yyyy) _____

Section (C)

Current status (please tick the right choice):
____ An outpatient
____ An inpatient (Hospital : _____)
____ Died (date : (dd/mm/yyyy) _____ : cause of death: _____)
____ Left HK/defaulted follow-up (date last seen: (dd/mm/yyyy) _____)

Section (D)

Name of medical practitioner: _____ in private practice/public service*
Correspondence Address:
_____
_____
Date: _____ Tel. no.: _____ Fax no.: _____ E-mail :_____

**delete whichever inappropriate*

DH 2293, revised August 2001

ALL INFORMATION WILL BE TREATED IN STRICT CONFIDENCE

FORM B: Obstetrician's Report					
To be completed by the obstetrician after delivery or termination or pregnancy					
1. Information of Mother	HIV no.	(if known)			
	Age				
	G _____ P _____				
	Date of HIV diagnosis				
2. HIV history	HIV status known in relation to this pregnancy*	☐ Before			
		☐ During	at ____ week		
		☐ After			
	Date				
3. Obstetric outcome *	Date of delivery/abortion: _____				
	☐ (a) Therapeutic abortion at ____ week, or				
	☐ (b) Spontaneous abortion at ____ week, or				
	☐ (c) Delivery at ____ week*	☐ i. Vaginal delivery			
		☐ ii. Caesarian section			
		☐ iii. Low forcep			
4. Prophylactic ART*	☐ No				
	☐ Yes	Prepartum	Medication (list)		
			Start date		
			End date		
		Intrapartum	Medication and dose		
			Date given		
5. Complications of pregnancy*	☐ No				
	☐ Yes: (specify) _____				
6. Current status	(a) Defaulted	Date: _____			
	(b) Mother referred for HIV care	Unit: _____			
	(c) Baby referred for specialist care	Unit: _____			
	(d) Mother continued for gynaecology care	Unit: _____			

* Please tick ones that apply

FORM C: Physician's Report				
To be completed by the physician caring for the mother not later than three months after delivery				
1. Information of Mother	HIV no.		(if known)	
	Age			
2. Latest HIV status	(a) CD4 at diagnosis		_____ cells/ml	
			Date	
	(b) VL at diagnosis		_____ copies/ml	
			Date	
			Method	bDNA / PCR / Others (specify):_____
	(c) Diagnosis of AIDS (For those who have AIDS only)		Pregnancy*	☐ Before
				☐ During
				☐ After
			Date	
			ADI	
	(d) Other clinical complications*		☐ No	
			☐ Yes (specify):_____	
3. ART	Initiation*	☐	HAART before pregnancy	
		☐	HAART during pregnancy	
		☐	Perinatal treatment to prevent MTCT only	
		☐	HAART within 3 months after delivery/ abortion	
		☐	Plan to start HAART later	
		☐	No plan of initiating HAART	
	Treatment strategy*	☐	Prepartum treatment only	
		☐	Intrapartum treatment only	
		☐	Prepartum and intrapartum treatment	
		☐	HAART for mother	
	Regimen (specify)			
4. Family history	HIV status	Spouse		
		Children		
		Others		
5. Current status* (3 month after delivery / abortion)	☐	Defaulted		Date: _____
	☐	Referred for clinical care followup		Unit: _____
	☐	Baby referred for clinical followup		Unit: _____

* Please tick ones that apply

FORM D: Paediatrician's report 1				
To be completed at the age of two months				
1. Information of baby and mother	HIV no.	Mother	(if known)	
		Baby	(if known)	
	Age of Mother			
2. Status at brith	Gender*	☐ Male		
		☐ Female		
	Birth weight	_____kg		
	Apgar score			
	Symptoms*	☐ No		
		☐ Yes :(specify) _____		
3. Neonatal health				
4. Perinatal ART treatment	Regimen			
	Start date			
	End date			
	Side effects*	☐ No		
		☐ Yes: (specify) _____		
5. HIV related complications*	☐ List			
	☐ Choice			
6. Status at 2 month	Followup*	☐ Outpatient (unit:_____)		
		☐ Inpatient (unit:_____)		
		☐ Defaulted (date: _____)		
		☐ Left Hong Kong (date: _____)		
		☐ Died (date: _____) Cause of death: _____		
	HIV	*test*	*result*	*date*
		Antibody		
		Antigen		
		PCR		
	Surrogates	*test*	*result*	*date*
		VL		
		CD4		

* Please tick ones that apply

FORM E: Paediatrician's report 2				
To be completed at the age of 15 months				
1. Information of mother	HIV no.		(if known)	
	Age			
2. HIV status	*test*	*result*	*date*	
	HIV Antibody			
	HIV antigen			
	CD4			
	VL			
	PCR			
3. Clinical history todate	Progression to AIDS*	☐ No		
		☐ Yes :(date) _____		
		ADI: _____		
	AIDS related clinical cx			
	Non-AIDS related cx	ADI: _____		
	Hospitalization*	☐ No		
		☐ Yes		
4. HAART (excluding perinatal prophylaxis)	Already started*	☐ No		
		☐ Yes		
	First regimen			
	Change of regimen	Start date: _____		
	Current regimen			
5. OI prophylaxis*	☐ No			
	☐ Yes	Primary		
		Secondary	PCP: _____	
			Other conditions: _____	
6. Complications of ART	S/E of perinatal prophylaxis*	☐ No		
		☐ Yes	persistent up to ___ months (specify: _____)	
7. Status at 15 month	Followup*	☐ Outpatient		
		☐ Inpatient		
		☐ Died		
		☐ Left Hong Kong		
		☐ Defaulted (date: _____)		

* Please tick ones that apply