UTILIZATION OF EARLY INFANT DIAGNOSIS OF HIV SERVICES AND FEEDING PRACTICES AMONG HIV POSITIVE MOTHERS IN DAR ES SALAAM, TANZANIA

Kabibi Paskazia Byabato, MD

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By

Kabibi Paskazia Byabato, MD

A Dissertation Submitted in Partial Fulfilment of the Requirement for the Degree of Master of Medicine (Paediatrics and child health) of Muhimbili University of Health and Allied Sciences.

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, a dissertation entitled**: Utilization of Early infant Diagnosis of HIV services and feeding practices among HIV positive mothers in Dar es Salaam, Tanzania**, in partial fulfilment of the requirement for the degree of Master of Medicine (Paediatrics and Child Health) of the Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam.

Prof. Karim Manji……..

Date……

Dr. Helga Naburi…….

Date……..

DECLARATION AND COPYRIGHT

I, **Kabibi P. Byabato**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature……..

Dr. Kabibi Paskazia Byabato, M.D

Date……

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DEDICATION

To my Mum and Dad

To my daughter Kristen

My sisters and brothers.

ABSTRACT

Background: The human immunodeficiency virus (HIV) infection in children is associated with high morbidity and mortality; studies have demonstrated that about 50% of these children die before their second birthday if not treated early. Following the introduction of early infant diagnosis (EID) using DNA PCR with dried blood spots (DBS) samples, many children who show up to the clinic early have opportunity to be tested according to the national guidelines. Early infant diagnosis of HIV infection not only helps to start antiretroviral therapy for HIV infected children, but it is also an opportunity to assess the infant feeding decisions and breastfeeding problems. Breastfeeding is still a recommended safe infant feeding option in resource limited settings to HIV exposed infants. However effective measures to prevent mother to child transmission (MTCT) of HIV through breast milk such as effective anti retroviral (ARV) prophylaxis or ART for eligible mothers are mandatory.

Objectives: To determine the utilisation of early infant diagnosis of HIV services and feeding practices among HIV-exposed infants attending the care and treatment centres (CTC) in Dar es salaam, Tanzania.

Methodology: A cross sectional hospital based descriptive study was conducted among HIV exposed infants attending postnatal clinic and CTC. Data collection included interviewing mother/ guardian using a standard structured questionnaire, review of antenatal (ANC) and reproductive and child health (RCH) cards. Median, range and means were used to summarize continuous data, proportions and rates for categorical data. Data analysis was done using statistical package for social science version 16. Chi square and Fisher's exact tests were used to determine association between categorical variables, p value of < 0.05 was considered statistically significant.

Results: A total of 432 parents/ guardians- infant pairs were involved in the study, 53.7% were females with mean age of 19 weeks ± 11.8. More than half (68.3%) of the parents/ guardians brought their HIV exposed infants for HIV early infant diagnosis on the given appointment dates. More than half (62.7%) of the infants had results at the end of the study and of these 9 (3.3%) were HIV positive. Median turnaround time (TAT) was 7weeks (1-41wks), reason was no results at the clinic (79%).

Few HIV mothers (31.9%) expected to continue breast feeding after HIV results of their infants,43.2% stopped breast feeding at median age at 12 weeks because of fearing of HIV transmission to their infants ($p = 0.039$).

Conclusion: More than half of the HIV exposed infants were brought for EID of HIV and had their results. Turnaround time (TAT) was 7 weeks with a reason that HIV results were not yet back at clinic; it is longer than the WHO recommended time of 4 weeks. Fear of HIV transmission to the infants was associated with low breast feeding rates.

Recommendations: There is a need for a study to establish the reasons for long TAT as well as strengthen the information, education and counseling on infant feeding practices.

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ABBREVIATIONS

AFASS	Acceptable, Feasible, Affordable, Sustainable, Safe
AIDS	Acquired immune-deficiency syndrome
ANC	AnteNatal Clinic
ART	Antiretroviral therapy
ARV	Antiretroviral
CDC	Centre for Disease Control
CTC	Care and Treatment Centre
DBS	Dried blood spot
DNA	Deoxyribonucleic acid
EID	Early infant diagnosis
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
IQR	Inter quartile range
KCMC	Kilimanjaro Christian medical centre
MTCT	Mother-to-child transmission
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
PCR	Polymerase chain reaction
PEPFAR	President's Emergency Plan for AIDS Relief
PMTCT	Prevention of mother-to-child transmission
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
WHO	World Health Organization
ZDV	Zidovudine

DEFINITION OF TERMS

For the purpose of this study, the following definitions were used

Turnaround time

Turnaround time is the time taken from when the DBS test is taken from the infant to the time when the results will be available to the infant (parent/ guardian).

Appointment date

Date given to the parent/ guardian to bring the HIV exposed infant for DNA PCR (DBS) test during discharge after delivery.

CHAPTER ONE

1.0 INTRODUCTION AND LITERATURE REVIEW

1.1 Magnitude of the problem

The human immunodeficiency virus, the causative agent of Acquired Immune Deficiency Syndrome (AIDS), is still among the major causes of infant and childhood morbidity and mortality. In the year 2001, approximately 3 million children under the age of 15years were infected with HIV globally, out of which 2.6 million were in Sub Saharan Africa [1]. More than 90 percent of paediatric infections are due to mother-to-child transmission. HIV-infected children are especially vulnerable given that without treatment, the majority of infected children die before two years of age [2]. Globally it is estimated that 370 000 (230 000–510 000) children were newly infected with HIV in 2009 and deaths among children younger than 15 years of age were estimated to be 260 000 (150 000–360 000) in 2009 [3]. In seven Sub-Saharan African countries, mortality due to HIV/AIDS in children aged under age five years has increased from 20 to 40 percent [4].

In Tanzania, the prevalence of HIV infection in adults is between 5.3% and 6.1% [5]. Estimation of 84,000 pregnant women were living with HIV in Tanzania in 2009 [6]. Around 1.2 million people aged 15 years and over are infected with HIV and estimated 100,000 Tanzanians were infected with HIV in 2009. With regard to children there are around 160,000 children living with HIV and more than 1 million children orphaned by AIDS in Tanzania [7]. Mortality attributed by HIV in children below five years of age was 16% in Tanzania. The prevalence of HIV infection among children admitted at MNH in 1996 was 19.2% and the mortality rate among these infected children was 21.4% [8].

1.2 Transmission of HIV in infants

In the absence of prevention, the risk of transmission of HIV from the mother to child ranges between 25 – 48% in communities where breastfeeding is a common practice and 14 – 32% where HIV infected mother do not breastfeed [9, 10]. In the developed countries, PMTCT interventions including prophylactic highly active antiretroviral therapy (HAART) during pregnancy coupled with delivery by caesarean section and use of Zidovudine (ZDV) for infants during the first six weeks after delivery reduces transmission rates to less than 2% in the absence of breastfeeding [10-12].

In resource limited settings where breastfeeding is a common practice, MTCT on rates of HIV have been reduced to less than 5% when feasible prophylactic ARV regimens are used [13]. When prevention of mother-to-child transmission (PMTCT) fails, the cost is enormous in terms of human suffering.

1.3 Early infant diagnosis (EID)

Infants are one of the most underrepresented populations in ART programs throughout the developing world due to challenges associated with EID [14]. This could result from the difficulties of diagnosing HIV infection in these infants, since the widely available rapid test used for adults is not reliable in children.

Early antiretroviral therapy requires accurate diagnosis of HIV infection, which is a challenge because the widely available antibody test is complicated by the presence of passively transferred maternal HIV–1 antibodies, which may be detectable in an HIV exposed but uninfected infant until 18 months of age [15, 16]. With the use of DNA–PCR (virological) test, HIV infection can be accurately diagnosed in infants as early as four to six weeks [17]. Through various efforts, of recent the facilities to perform virological tests are now available in the resource limited settings. However the capacity for performing DNA PCR test is still limited and they are mostly performed in the centralized laboratories.

The DNA PCR test is recommended for all HIV– exposed children, preferably at the time when they attend their first immunization clinic which is around 4 to 6 weeks of age. WHO suggests that, one positive virological test at 4-6 weeks is sufficient to confirm HIV infection in an infant, however for the breastfeeding infant since they are still exposed to HIV through breast milk, if the first virological test is negative, it must be repeated 6 weeks after complete cessation of breastfeeding [18].

In the resource limited setting early infant diagnosis is increasingly becoming available for infants, where currently HIV DNA PCR on the dried blood spot (DBS) is the gold standard for early infant diagnosis [19, 20]. The Dried Blood Spots (DBS) are easy to prepare in a resource-limited setting and can be stored and transported to testing facilities without refrigeration [21]. DBS sample is collected from the baby's foot or hand (if above 10 kg) by simple prick and put a drop of blood on the filter paper, it should be stored horizontally out of direct sunlight for at least three hours. Once dry, samples are stored in sealable plastic bags with desiccant packets and a humidity card and are ready for transport to the central laboratory. DNA PCR testing using DBS has been proven to be as effective as PCR using liquid blood samples, with sensitivity of 100 percent, and a specificity of 99.6 percent [21].

In Tanzania early infant diagnosis started as a pilot program using HIV DNA PCR testing in Bugando Medical Centre in 2006. Currently the early infant diagnosis has been scaled up in four zonal laboratories in the four referral hospitals namely Kilimanjaro Christian Medical Centre (KCMC), Muhimbili National Hospital, Mbeya referral hospital and Bugando Medical Centre. With this approach, collected DBS samples from the periphery centres must be transported to the central laboratories and the results transported back to the periphery centres.

Apart from difficulties in performing DNA PCR, there are challenges associated with effective early diagnosis of HIV in infants and timely delivery of results is also a challenge. As it was seen in the study done in Nairobi, the ideal turn-around time of two weeks between sample collection and delivery of results was not reached, but improved

from an average of four weeks to three [22]. A study which was done in Tanzania by Nuwagaba et al, had a median time of 5 and 10 weeks among those tested PCR positive and negative respectively, but there is a fear that this might increase as the program scale up hence less attention is paid to it [23].

The turnaround time differs in different studies; this might be contributed with distance between the central laboratories and service providing sites, means of transporting the specimen, returning the results, manpower in the service providing sites and laboratories. The Zambian study had a turnaround time of 9 days, Tanzania 21 days and Lesotho 6 weeks [24-26]. Transport time, testing capacity and other logistics have been observed in other resources limited settings to interfere with provision of results in time for early intervention.

Early diagnosis of HIV infection not only allows health care providers to offer early antiretroviral therapy and cotrimoxazole prophylaxis for HIV infected children before they become symptomatic, but also assists in counselling for infant feeding decisions.

1.4 ART in children

Provision of antiretroviral therapy (ART) for HIV infected children is very rewarding since children often respond well to treatment, with a significantly improved quality of life and life expectancy. This is particularly true among the young infants, who are at the highest risk of death from AIDS, but also are difficult to diagnose earlier and promptly initiate ARV drug formulations[1]. Despite the encouraging increase in number of children on anti-retroviral treatment, HIV exposed infants are not getting diagnosed and are not started early on treatment [27].

Without antiretroviral therapy, up to 33% of perinatally infected children will die before their first birthday and this increases to 50% by the end of their second year [28, 29]. A South African study has reported that when early antiretroviral therapy is initiated in the

first 12 weeks of age to HIV infected infants, their survival rate improves by 76% and reduce the progression to full blown AIDS by 75% [30]. Currently, WHO recommends initiating ARV to all infants confirmed HIV positive within their first year of life regardless of CD4 count or clinical stage [31].

1.5 Breastfeeding in HIV positive mothers

In developing countries more than 90% of women breastfeed their babies even if they are HIV positive [32]. Despite the known risk of HIV transmission through breast milk, WHO recommends exclusive breastfeeding for the first 6 months in resource limited setting if the alternative feeding is not acceptable, feasible, affordable, sustainable and safe (AFASS). However effective PMTCT measures should be in place to prevent MTCT of HIV during breastfeeding period. Not breastfeeding during early months of life is associated with a significant increase in mortality from infectious diseases and malnutrition; therefore in resources limited countries the benefits of breastfeeding outweigh the risk of MTCT was the basis for the above WHO recommendation [29, 32, 33,34].

Breastfeeding for HIV positive mothers is being researched and modified rapidly [35]. Despite of all these efforts, breastfeeding with HIV is still a very challenging issue especially in mothers who are HIV positive with HIV negative infants. HIV infected mothers fear of transmitting HIV to their infants through breast milk hence the mother could choose not to breastfeed his or her infant or stop breastfeeding early even if she is not having AFASS alternative to breast milk [36, 37]. Another challenge is on implementation and support of the programmes that provide PMCT services. Descriptive cross section study was among four countries, Uganda, Kenya, Malawi and Bostwana showed that there was universal belief that HIV positive mother who breastfeeds her child will always infect the child and intentional avoidance of breastfeeding by the mother indicates that she is HIV positive [38].

The new WHO guideline on HIV and breastfeeding allows mothers to exclusively breastfeed for 6months and continue breastfeeding the child until one year old while on continuous ARV [39]. HIV positive mothers who opt to breastfeed their infants will need adequate support through counselling to enable them overcome these challenges and preserve infant feeding options of their choice [36].

1.6 Retention of HIV exposed infants in PMTCT program

For maximum benefits of PMTCT interventions, mother-infant pairs retention into the program is essential until the end of the PMTCT cascade. Retention of HIV exposed infants in PMTCT programs is very low, as demonstrated in a South African study showed that by six months of age about 80% of infants are already lost to follow– up [40]. In the study done in Nairobi, reasons for lost to follow-up of HIV exposed infants were identified as death of infants or death of their parents leaving them as orphans with no one to bring them back to the clinic for care also large communities are fluidly, creating additional barriers to follow-up [22].

Among those who had PCR test in the Tanzanian study, 55% of the HIV exposed infants' parents/ guardians returned for follow –up to collect the PCR test result [23], however the study did not investigate reasons for poor retention. This creates the missed opportunity for early identification of HIV infected infants, access to prophylaxis for opportunistic infections and provision of antiretroviral therapy for HIV infected infants before they become symptomatic.

1.7 Statement of problem

Majority of HIV infected infants would die before their 2nd birthday if no intervention is provided. WHO and National AIDS control program guidelines recommend early ARV to these infants; however EID is the key to provision of early ARVs. Currently EID

using DBS has become available in central laboratories in the country, which requires collection of the sample, sending sample to the laboratory and getting back results. This process has a lot of logistics issues which may influence the turnaround time for these results.

Prior to DNA PCR availability, infant diagnosis was being confirmed at 18 months, which was the period after many infants had stopped breastfeeding and the knowledge of HIV status at that age would have no effect on the infant feeding practice. However with EID many infants HIV status is confirmed earlier when the infants are still within the period of recommended exclusive breastfeeding and hence may affect mothers infant feeding practices.

1.8 Rationale of the study

With the introduction of EID many infants HIV status are confirmed early before they are through with the recommended duration of exclusive breastfeeding (6 months). Following this is not known how this will affect the infant feeding practices of mothers in Tanzania. Further more logistics of EID are somehow complicated and this has been shown in other countries to compromise the turnaround time for the DNA PCR results and hence compromising the early confirmation of HIV and early ARV for HIV infected infants.

Findings from this study were expected to provide information about the turnaround time for DNA PCR results in order to improve EID services. The findings would also show the expectations of infant feeding practices after EID and reasons which would be the key to identify strategies for strengthening infant feeding counselling. This will eventually improve care of HIV exposed children and reduce morbidity and mortality.

1.9 Objective

1.9.1 Broad objective

To determine the utilization of early infant diagnosis of HIV services and feeding practices among HIV-exposed infants attending the CTC in Dar es salaam, Tanzania.

1.9.2 Specific objectives

1.9.2.1 To determine the proportion of parents/ guardians who will bring their infants for HIV testing as per given appointment date.

1.9.2.2 To determine the turnaround time of dried blood spot (DNA PCR) results.

1.9.2.3 To determine the proportion of parents/ guardians who will receive their infants' DBS results at the end of the study.

1.9.2.4 To determine the median age at receiving the DBS results.

1.9.2.5 To determine the feeding practices of parents/ guardians of HIV exposed infants.

1.9.2.6 To determine the median age at replacement feeding.

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study design

This was a hospital based cross sectional descriptive study.

2.2 Study area

This study was conducted at Muhimbili National Hospital (MNH) postnatal clinic and three main CTCs in regional hospitals (i.e: Mwananyamala, Temeke and Amana), Dar es salaam, Tanzania.

MNH is the largest referral, consultant and University teaching hospital in Tanzania. Its catchments areas are Temeke, Kinondoni and Ilala districts in Dar es salaam; in addition it receives referrals from all over the country. The MNH laboratory, serves as one of the central laboratory for performing DBS tests in Tanzania. Regions which use this laboratory include Dar es salaam, Coast, Lindi and Mtwara.

EID services at MNH are carried out in PMTCT clinic. During discharge after delivery the HIV positive mother is given an appointment to bring the infant for DNA PCR (DBS) test at 4 weeks of age (during the first postnatal clinic visit), when the infant is found to be HIV infected is referred to the CTC and HIV negative infants are followed up in the postnatal clinic until confirmation of HIV status is done. The postnatal clinic receives 7 to 10 HIV exposed infants per day and it runs twice a week on Monday and Friday.

The CTCs in 3 regional hospitals (Mwananyamala, Temeke and Amana) CTC clinics run once a week on Friday, they receive 15 to 20 HIV exposed infants per day. Pregnant mothers are counselled and tested for HIV at PMTCT clinics. Mothers who are HIV positive, especially newly diagnosed ones, are offered ART whether for the PMTCT or for maternal health. Health education on feeding and feeding options, EID for the infants

are also discussed. Follow up continues until delivery whereby they are given appointment dates (4 weeks of age) for DBS testing for their infant during discharge. Follow up of the HIV exposed infants is being done at the CTCs until the infant is confirmed HIV negative and for those whom are HIV infected they start ART.

2.3 Study population

All HIV exposed infants attending at postnatal clinic at MNH and the 3 main CTCs during the study period.

2.4 Study duration

The study was conducted from May to December, 2011.

2.5 Inclusion and exclusion criteria

Inclusion

- All HIV exposed infants whose mothers had an ANC cards documented as PMTCT 1.
- All HIV exposed infants who were brought by their guardians with RCH or ANC documented PMTCT 1.
- Those parents/ guardians who consented to participate in the study.

Exclusion

HIV exposed infants whose parents/ guardian did not consent.

2.6 Sampling

2.6.1 Sample size estimation

The sample size was determined using the following formula;

$$N = \frac{z^2 p (1-p)}{d^2}$$

Where:

N is the sample size

Z is 95% significant level which is 1.96

P is the expected prevalence level of utilizing EID services which is 50% (no study which has been done around)

D is the desired precision which is 5%

$$N = \frac{1.96^2 x 0.5 (1-0.5)}{0.05^2} = 384$$

Hence the minimum sample size was 400 children.

2.6.2 Sampling technique and recruitment

During the study period, all parents/ guardians with HIV exposed infants were identified at attendance. Those parents/ guardians, who agreed and signed the written consents to participate in the study, were enrolled consecutively until when the sample size was reached.

2.7 Data collection

2.7.1 Data collection technique

Infants were being identified by the counselling nurse during counselling and asked to be seen by the investigator who is doing the study after finishing the services. I introduced myself and informed the parents/ guardians about the study and asked them for consent. Information about the appointment dates was obtained from the parent/ guardian and confirmed from the RCH card of the infant. Other information was recorded in a designed questionnaire developed for the purpose of this study (Appendix 3). During the visit, mothers/ guardians were interviewed about their infant feeding practices (breast feeding only, replacement feeding only or mixed) before DNA- PCR sample is taken and after the DNA- PCR results, to document any change in infants feeding practice and reasons for change. Other information included the demographic data (age, sex), dates for DBS test and for the result, HIV status of the infant.

2.8 Pilot testing

Before commencing the major research, pre-testing was done. This was done to test whether the questionnaire will provide the range and quality of information required. Necessary changes were made before the actual implementation of the study.
One day orientation was conducted to the research assistants on filling the questionnaire.

2.9 Ethical clearance

Ethical clearance to undertake this study was requested from the Higher Degree Research and Publication committee of the Muhimbili University of Health and Allied Sciences.

2.10 Ethical considerations

The 3 hospital in-charge of Mwananyamala, Temeke and Amana hospitals; and MNH Director were asked for permission to conduct this research in their respective centres.

The informed written consent was obtained from each parent/ guardian prior to enrolment. It will be the right of the parent/ guardian to ask questions or refuse participation. Confidentiality was ensured by privately conducting the interviews by single parent/ guardian infant pair.

The parent/ guardian was counselled on the aims of the study, the complications, potential benefits and risks if any and she/ he was assured of confidentiality of any information given as well as tests results.

Infants whose parents/ guardians refused to participate in the study were not denied of their rights for treatment. Their children were managed as any infant attending the clinic on the laid down principles of management.

2.11 Data processing and analysis

The principal investigator checked the correctness and completeness of the data on daily basis throughout the period of data collection. Re-interview was done where necessary for problem correction. The questionnaires were sorted and numbered.

Data entry and cleaning was done using EPI Info version 6. Statistical Package for Social Science version 16 was used for data analysis. Data were summarized using median, mean, range and standard deviation for continuous data and proportions for categorical data. Chi square test and fisher's exact test was used to determine association between categorical variables and student t test was used to determine the association between continuous variables. The p value of < 0.05 was considered statistically significant.

CHAPTER THREE

3.0 RESULTS

Enrolment of 432 parent/ guardian-infant pairs was done with 53.7% being female infants and 58.1% of their parents/ guardians being married. The mean age at attendance was 19 weeks ± 11.8. Most of the infants were brought by their mothers for early infant diagnosis of HIV. There were 62.7% of parents/ guardians who had primary education, whereby 83.8% of the parents/ guardians and 69.8% of their partners were not employed (Table 1a).

Table 1(a). Sociodemographic characteristics of study population.

Variables	Number of respondents (N)	Percentage (%)
Age groups(Weeks) (N= 432)		
≤ 6	60	13.9
≥7	372	86.1
Sex of infant (N=432)		
Female	232	53.7
Male	200	46.3
Parent/ guardian marital status (N= 432)		
Single	168	38.9
Married	251	58.1
Divorced	9	2.1
Widow/ widower	4	0.9
Parent/ guardian relationship with the infant(s) (N=432)		
Mother	422	97.7
Father	6	1.4
Guardian	4	0.9
Parent/ guardian level of education(N= 432)		
Informal	55	12.7
Primary	271	62.7
Secondary	77	17.8
Tertiary	29	6.7
Parent/ guardian occupation(N= 432)		
Not employed	362	83.8
Employed	70	16.2
Parent/ guardian spouse/ partner occupation(N=420)		
Not employed	293	69.8
Employed	127	30.2

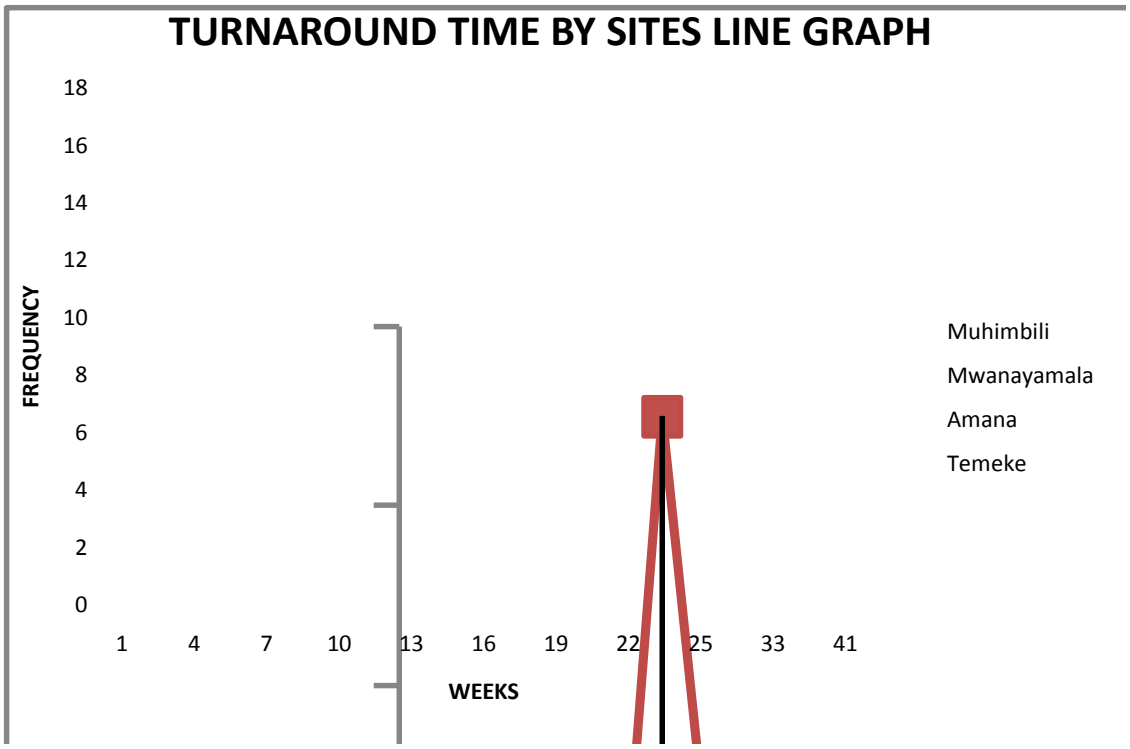
Majority, 68.3% of the parents/ guardians brought their HIV exposed infants for HIV early infant diagnosis as per given appointment dates and DBS was done. Among the 432 infants tested, only 271(62.7%) infants had results at the end of the study and of these 9 (3.3%) were HIV positive. Two infants among the 9 with HIV positive results had started the ARV at 23 and 34 weeks of age respectively (Table1 b).

Table 1(b). HIV testing appointment dates turn up and results for the HIV exposed infants.

Variables	Number of respondents (N)	Percentage (%)
Appointment dates for testing(N= 432)		
Came at appointment date	295	68.3
Missed the appointment date	109	25.2
Not given appointment date	28	6.3
Infants' HIV results(N = 271)		
Positive	9	3.3
Negative	262	96.7
Total	271	100

The turnaround time for DBS (DNA PCR) test results ranged from 1to 41 weeks with median of 7 weeks (IQR, 4-10). This were different from one site to another whereby Muhimbili had the shortest time of 1week, Mwananyamala and Amana 2.5 weeks each, and Temeke 2 weeks (Fig. 1).

Figure 1. Line graph showing the turnaround time.



Seventy nine percent (79%) of the parents/ guardians said that the HIV (DBS) results were not yet back at the clinic as one the reason for delay in getting these results (Table 2).

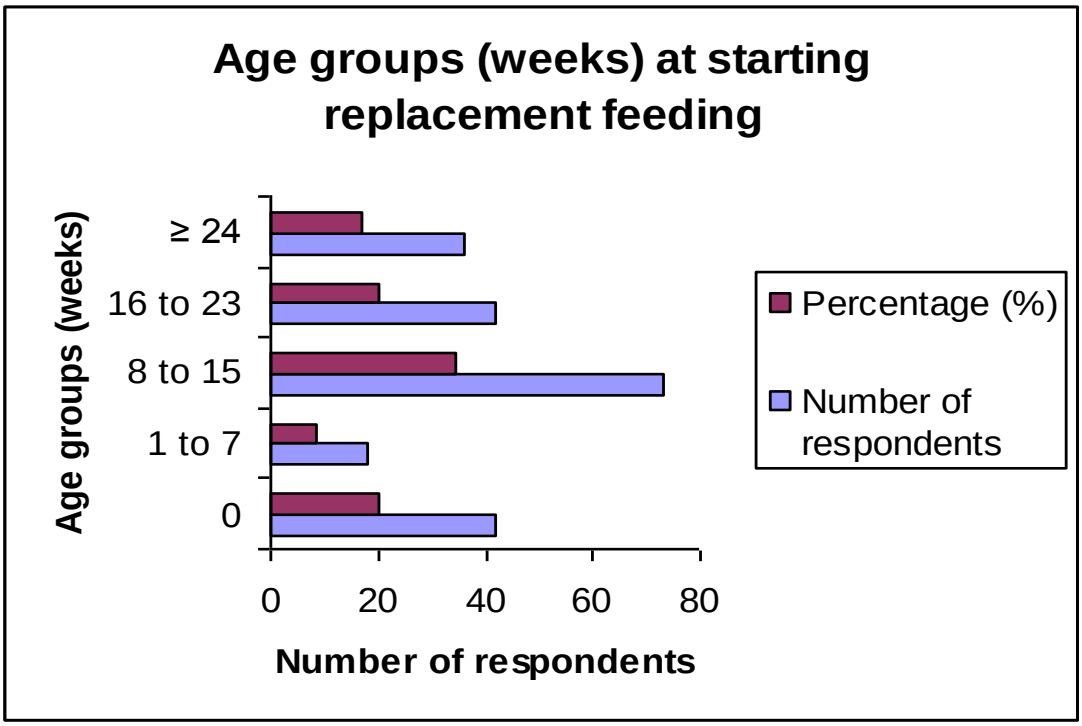
Table 2. Reasons for late HIV (DBS) test results (N = 432).

Reasons	Number of respondents(N)	Percentage (%)
Parents/ guardians are not coming at appointment dates	89	21
Results are not yet back at the clinic	343	79

Fifty percent of HIV positive mothers were exclusively breast feeding their infants at recruitment; of these 69 (31.9%)of the HIV positive mothers expected to continue breast feeding their infants after getting the HIV results while 126 (58.3%) HIV positive mothers expected to stop breast feeding. Moreover, 21(9.7%) were not sure whether to continue or stop breast feeding their infants after getting the HIV results.

Among the 211 who were practicing replacement feeding, 169 HIV positive mothers stopped breast feeding their infants at different intervals while 42 (19.9%) infants were not breast fed at all. Most of the mothers, 73(34.6%) stopped breast feeding their infants at the age 8 – 15 weeks old. The median age at stopping breast feeding was 12 weeks (IQR, 4-20) (Figure 2).

Figure 2. Bar chart showing the age at starting replacement feeding.



Among the 271 infants who had their HIV results, 262 were HIV negative of these 95(36.3%) and 166 (63.4%) were being breast fed and had replacement feeding respectively; out of the 9 HIV positive infants, 11.1% were on mixed feeding. There was no statistical difference in feeding practice between HIV positive and HIV negative infants (p = 0.092) (Table 3).

Table 3. Infant feeding practice among HIV positive mothers in relation to infant HIV status.

Mode of feeding	HIV results			Total
	Positive	Negative	No results	
Breast feeding only	3	95	118	216
Replacement feeding	5	166	40	211
Mixed feeding	1	1	3	5
Total	9	262	161	432

Among the 432 HIV positive mothers one of the 3 infant feeding options was practiced i.e: breastfeeding only, replacement feeding only and mixed feeding. There was no relationship between the socio-demographic characteristics and the feeding practice of the HIV positive mothers. Parent/ guardian relationship with the infant(s) (p = 0.183), parent/ guardian marital status (p = 0.174), parent/ guardian and spouse/ partner occupation (p = 0.403 and p = 0.189). In parent/guardian level of education (p = 0.159) (Table 4).

Table 4. Relationship between sociodemographic characteristics and mode of feeding of HIV exposed infants.

Variables	Feeding options			Total	P value
	Breast feeding only N(%)	Replacement feeding N(%)	Mixed feeding N(%)		
Parent/ guardian relationship with the infant(s) (N = 432)					
Mother	212(50.2)	205(48.6)	5(1.2)	422	0.183
Father	4(66.7)	2(33.3)	0(0)	6	
Guardian	0(0)	4(100)	0(0)	4	
Parent/ guardian marital status (N = 432)					
Single	86(51.2)	81(48.2)	1(0.6)	168	0.174
Married	125(49.8)	123(49)	3(1.2)	251	
Divorced	3(33.3)	6(66.7)	0(0)	9	
Widow/ widower	2(50)	1(25)	1(25)	4	
Parent/ guardian occupation (N = 432)					
Not Employed	185(51.1)	172(47.5)	5(1.4)	362	0.403
Employed	31(44.3)	39(55.7)	0(0)	70	
Parent/ guardian spouse/ partner occupation (N = 420)					
Not employed	140(47.8)	149(50.9)	4(1.4)	293	0.189
Employed	71(55.9)	56(44.1)	0(0)	127	
Parent/ guardian level of education (N =432)					
Informal	28(50.9)	24(43.6)	3(5.5)	55	0.159
Primary	132(48.7)	138(50.9)	1(0.4)	271	
Secondary	40(51.9)	36(46.8)	1(1.3)	77	
Tertiary	16(55.2)	13(44.8)	0(0)	29	

After getting HIV results, 72.6% of mothers of infants with HIV negative results expected to stop breast feeding them, while 33.3% of the mothers of HIV positive infants did not know whether they should continue or stop breast feeding their infants (p = 0.034) (Table 5).

Table 5. Breast feeding practice among HIV positive mothers after infant's HIV results. (N= 98)

Breast feeding practice	**HIV results**		**Total**	**P value**
	Positive N(%)	**Negative N(%)**		
Continue	2 (66.7)	20 (21.1)	22(22.4)	
Stop	0 (0)	69 (72.6)	69(70.4)	0.034
Not sure	1 (33.3)	6 (6.3)	7(7.1)	

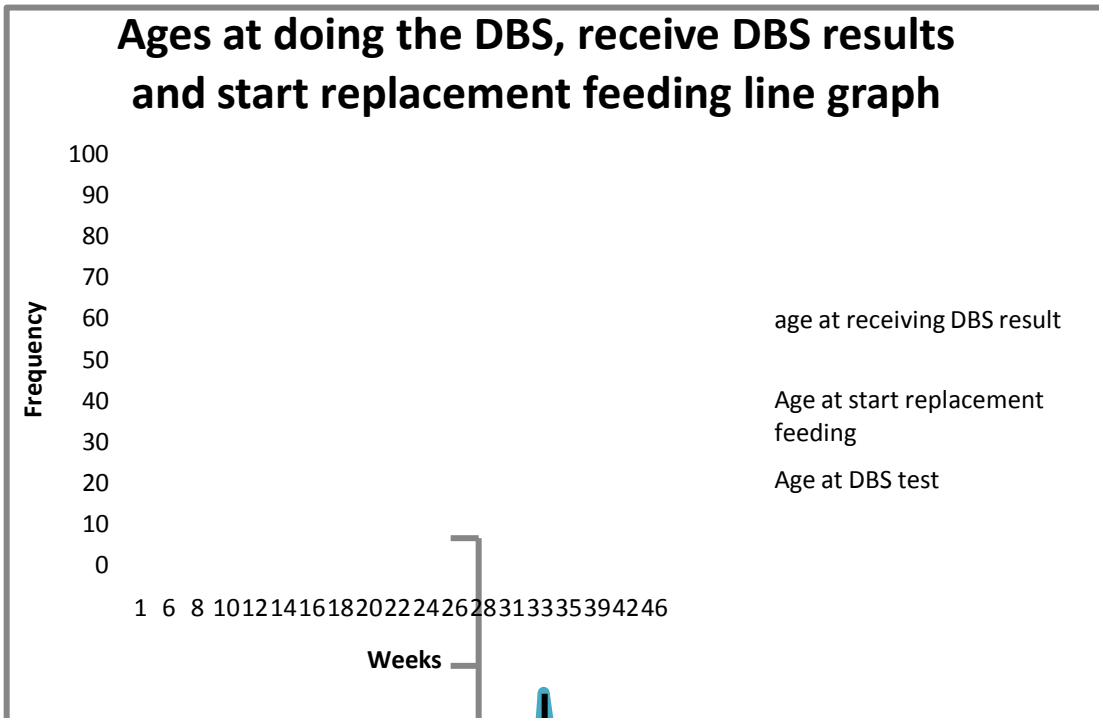
Most of the mothers significantly stopped breast feeding at 15 weeks fearing of HIV transmission (p = 0.039) (Table 6).

Table 6. Reasons for HIV positive mothers stop breast feeding their infants (N= 169).

Infant age groups at stopping breastfeeding(weeks)	**Mothers reasons for stopping breast feeding their infants**		**P value**
	Fear of HIV transmission N(%)	**Breast milk not enough N(%)**	
1 – 7	16 (9.6)	2 (66.7)	
8 -15	72 (43.4)	1(33.3)	
16 – 23	42 (25.3)	0 (0)	0.039
24 -30	36 (21.7)	0 (0)	
Total	166 (100)	3 (100)	

The median age at receiving the DBS results was 14 weeks (IQR, 11 – 19 weeks).

Figure 3. Line graph showing the age at doing DBS test, age at receiving DBS results and age at starting replacement feeding.



CHAPTER FOUR

4.0 DISCUSSION

Early infant diagnosis of HIV is one of the most important challenges in the management of paediatric HIV infection in resource limited settings. A total number of 432 parent/ guardian -infant pairs were interviewed in this study. Among these, 60 (13.9%) were below 6 weeks and both sexes were equally represented. The mean age at attendance was 19 weeks ± 11.8. Most of the infants were brought by their mothers for early infant diagnosis of HIV. There were 62.7% of the participants who had primary education and majorities (83.8%) were not employed.

Efforts are being made to encourage parents with HIV exposed infants to know early their baby's HIV status so as to be provided with early and proper care. Majority, 68.3% of the parents/ guardians brought their HIV exposed infants for HIV early infant diagnosis on the appointment dates. More than half (62.7%) of the tested infants had their HIV results at the end of the study period, 37.26% of the parents/ guardians did not collect the DBS results until the end of the study due to the speculated reasons which included the results were not yet back at the clinic, return dates/ appointments were not yet and for those whom results were ready at the clinic could not be traced.

Among the 271 participants who had received the HIV results of their infants, 3.3% were HIV positive; this was similar to the study which was done in Cameroon whereby 3.7% of infants whose family returned to collect the result had HIV infection[40], it was done in infants at multiple sites. Among the 9 infants whom tested HIV positive, only two 22.2% had started the ARV at 23 and 34 weeks respectively, this is late compared to the relevance of early testing of HIV. When early antiretroviral therapy is initiated in the first 12 weeks of age to HIV infected infants, their survival rate improves by 76% [17.] Though of current, WHO recommends to

initiate ART for all HIV infected infants diagnosed in the 1st year of life irrespective of CD4 count or WHO clinical stage [31].

The 271(62.7%) infants who had results at the end of the study had median turnaround time of 7 weeks (ranging 1week - 41 weeks), it is almost similar to the studies which have been done in different parts of sSA; the Zambian study had 9 days in Zambia, Tanzania 3 weeks and Lesotho 6 weeks [25, 26] while was 5weeks in Cameroon[41]. Study by Nuwagaba et al in Tanzania had a median turn around time of 5 and 10 weeks among positive and negative HIV test respectively, though it was expected to rise as the program scale up and less attention is paid to it [24]. In Nairobi, it was 4 to 3 weeks [23]. This is longer than the TAT which is recommended by WHO of 4 weeks [31].

This study was done in the area where one of the central laboratories is located, MNH laboratory in Dar es salaam is for coastal zone/ region, still the TAT was long of 7 weeks instead of the ideal 2 weeks and 4 weeks recommended by WHO. TAT was differing from one site to another with Muhimbili having the shortest time, this could be so because the laboratory is located in the same hospital. The main reason which was mentioned by majority of the parents/ guardians for getting results late was the results were not yet back at the clinic. This might have been occurred due different causes which were not studied by this study. The turnaround time differs in different studies; this might be contributed with manpower in the service providing sites and laboratories. Testing capacity and other logistics have been observed in resources limited settings to interfere with provision of results in time for early intervention as it was observed in Mozambique [28].

In this study, there was equal proportion of mode of feeding (breast feeding only and replacement feeding), with 1.2% of parents who practiced mixed feeding. In developing countries more than 90% of women breastfeed their babies even if they are HIV positive because they do not have acceptable, feasible, affordable,

sustainable and safe (AFASS) alternative to breastfeeding [32], this was a follow up study.

Proportion of parent/ infant pairs who expected to adhere to the feeding practice after EID were 31.9% for those whom were breast feeding and 42 (19.9%) who did not breast feed at all. Those who stopped breast feeding, 43.2% of them stopped breast feeding at 8 – 15 weeks of age with median age at 12 weeks, this was the same as it was observed in another study by Sera LY et al in Dar es salaam, whereby the overall median duration of EBF among women who ever breast-fed was 3 months, this could reflect the return to work after the 3-month of resting post delivery [42]. Family support in this environment is vital because it is common in Tanzania for a mother-inlaw to make decisions surrounding breast-feeding duration and introduction of other foods for her daughter-in-law and grand children [43]. Hence there is a need for the community, not only the mother herself or the infant feeding counsellors to be aware of the most up-to-date infant feeding recommendations in order to properly support the breast-feeding mother. The suboptimal durations of breastfeeding, which was observed in this study, are common throughout the world in both HIV-positive and HIV-negative populations [44-47]. In this study, it was seen that HIV positive mothers stop breast feeding 2 weeks before they get the DBS results of their infants; this might bring unnecessary and serious problems (e.g. malnutrition, diarrhoea) to those infants who are diagnosed to be HIV positive.

Among the 271 infants who had their HIV results, 262 were HIV negative, 95(36.3%) and 166 (63.4%) were being breast fed and had replacement feeding respectively; 11.1% of the HIV positive infants had mixed feeding. There was no difference on feeding practice and HIV results ($p = 0.092$), this might be due to small number of study population.

After getting HIV results, 72.6% of those infants with HIV negative results their mothers expected to stop breast feeding them, while 33.3% of the mothers with HIV infected infants did not know whether to continue or stop breast feeding their infants

(p = 0.034). Majority166 (98.2%) of the HIV positive mothers stopped breast feeding because of fear of HIV transmission through breast milk to their infants, this was also observed in the study done by Coutsoudis et al in South Africa and a qualitative study by Lazarus et al [47, 48]. In other studies, fear of HIV transmission through breast milk caused some women to avoid breast-feeding or prematurely wean their babies, even in the absence of AFASS alternatives [37, 43, 49].

Other reasons for stopping breast feeding in this study included milk supply is inadequate and that breast milk alone is insufficient for optimal infant growth and development and this was also observed in qualitative studies [50,51,52]. Two among the 98 infants who had their HIV results and were exclusively breast fed, their mothers continued to breast feed them because they were already infected with HIV. For areas where AFASS alternative to breastfeeding can not be applied, WHO recommends HIV infected mothers to exclusive breastfeed their infants for the first 6 months of life and introduce complementary foods while continuing breastfeeding for the 1st twelve months of life. Gradual weaning for 1 month is recommended before stopping breastfeeding when AFASS alternative to breastfeeding can be practised. Maternal or infant ARV prophylaxis should be continued until 1 week after breastfeeding is stopped fully [39].

CHAPTER FIVE

5.0CONCLUSION

More than half of the HIV exposed infants were brought for EID of HIV and had their results.TAT for DBS results was 7weeks which is longer than the 4 weeks recommended by WHO. There was equal proportion of mode of feeding (breast feeding only and replacement feeding) though majority of the HIV infected mothers who were breastfeeding, expected to stop breastfeeding their infants after getting their infants' HIV results. High percentage of HIV infected mothers who were practising replacement feeding, stopped breastfeeding at 15 weeks because of fear of infecting their infants through breast milk.

5.1 STUDY LIMITATION

This was a cross sectional study, so it was difficult to follow up the reasons for late DBS results and trend of feeding practice over a period of time. Longitudinal study could have been the ideal study design but it was limited by time to do the follow up study.

Study was done in the urban settings it might not be the real picture in the rural setting.

5.2 RECOMMENDATIONS

Bigger and follow up qualitative study is needed to determine the reasons for long duration of DBS results.

Since most of the HIV infected mothers plan to stop breastfeeding after EID, information, education and counselling on the role of breast feeding and extended use of niverapine as per WHO should be emphasized during EID.

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APPENDICES

APPENDIX I: Consent form (English version)

Concert form to participate in the study to determine the utilization of early infant diagnosis services and feeding practices among HIV exposed infants attending the CTC in Dar es salaam, Tanzania.

My name is Dr Kabibi P. Byabato.

I am a resident doctor working in the department of Paediatrics and Child health, MUHAS and MNH. I am doing a research study to assess the challenges of early infant diagnosis at MNH, Dar Es Salaam, Tanzania.

I would like to request you and your child to participate in this study.

First I will explain to you about the study and then I will answer any questions that you may have.

Aim of the study

This study will determine the utilization of early infant diagnosis services e.g.; turnaround time, behaviour of breastfeeding after getting HIV results. The information we gather will assist on planning for the future, especially creating awareness to other parents/ guardians.

Participation in the study is completely voluntary, even if you will not allow your child to participate in this study; he/she will continue with medical services and care in this hospital.

Confidentiality

Participation in the study will be anonymous, names and particulars of participants will not be open to the public. Only the investigator and the research assistants will make an interview.

Risks

No any procedure will be done in this study. We do not expect your child to experience any problems as a result of this study and no intervention will be offered. Parents/ guardians and infants will continue to receive counselling, prophylaxis and treatment according to the PMTCT and National AIDS control program standard protocols at the clinic.

Now I am ready to answer any questions you wish to ask concerning this study.

For any questions or problems contact the following person

Prof. M. Aboud;
Director, Research and publication committee;
Muhimbili University of Health and Allied sciences (MUHAS);
P.O. Box 65001, Dar es Salaam

Principle Investigator

Dr Kabibi P. Byabato

Department of paediatrics & Child Health MUHAS

P.O Box 65001 Dar Es Salaam

Tel: 255784 524 968

E-mail:kbyabato2001@yahoo.com

I.....have read and been told the content of this form and understood. My questions have been answered to my satisfaction. I agree my child to participate in this study.

…… ……...

Date Signature of Parent/Guardian

…….

Researcher's/ Research Assistant's signature

APPENDIX II: Consent form (Swahili version)

Makubaliano ya kushiriki katika utafiti kuhusu utumiaji wa huduma za kutambua virusi vya UKIMWI mapema na ulishaji katika watoto wa umri chini ya mwaka 1, Dar es salaam, Tanzania.

Mimi naitwa Dr. Kabibi P. Byabato, niko kwenye mafunzo ya uzamili idara ya magonjwa ya watoto katika chuo kikuu cha sayansi ya tiba ya jamii katika hospitali ya Taifa ya Muhimbili.

Tunafanya utafiti kuhusu utumiaji wa huduma za kutambua virusi vya UKIMWI mapema na ulishaji katika watoto wa umri chini ya mwaka 1, Dar es salaam, Tanzania.

Ukiwa kama Mzazi/Mlezi wa mtoto anayehudhuria kliniki ya watoto wachanga waathirika wa UKIMWI, tunapenda kukuuliza kama unakubali mtoto/ watoto wako ashiriki katika utafiti huu.

Awali ya yote nitakueleza kuhusu utafiti huu na nitajibu maswali yako yote utakayoniuliza kuhusu utafiti huu baada ya kusikiliza/kusoma maelezo yangu.

Madhumuni ya utafiti

Lengo ni kuona changamoto za kutambua virusi vya UKIMWI mapema katika watoto wa umri chini ya mwaka 1, Dar es salaam, Tanzania.

Jinsi ya kushiriki katika utafiti.

Utafiti huu ni wa hiari kabisa. Kama hautapendelea mtoto/ watoto wako ashiriki katika utafiti huu, mtoto/ watoto ataendelea kupata huduma zote za kawaida katika hosipitali hii.

Usiri

Jina la mtoto na habari zake zote itakuwa siri kati ya mtafiti na mzazi/mlezi/mgonjwa. Watu wengine hawataruhusiwa kuona habari za mgonjwa ila wafanyakazi maalum wa utafiti huu.

Faida

Wazazi/walezi watakaokubali watoto wao washiriki katika utafiti huu wataelezwa matokeo ya utafiti. Wale watakaoonekana kuwa na matatizo watapewa ushauri zaidi.

Athari

Uchunguzi utakaofanyika katika utafiti huu ni wa kawaida kabisa . Hatutegemei mtoto wako kupata athari zozote kutokana na utafiti huu na hakuna matibabu yoyote yatakayotolewa na utafiti huu. Mama na mtoto mtaendelea kupata huduma ya ushauri nasaha, matibabu kulingana na mwongozo wa PMTCT and National AIDS control program katika klinik.

Sasa niko tayari kujibu swali lolote kama unalo kuhusu utafiti huu.

Tafadhali wasiliana na wafuatao ukiwa na maswali au tatizo kuhusiana na utafiti huu.

Prof. M. Aboud
Mkuu wa tafiti,
Chuo kikuu Cha Afya na Sayansi za tiba Muhimbili;
S.L.P 65001 Dar es Salaam.

Mtafiti mkuu :
Dr .Kabibi P. Byabato
Mwanafunzi wa shahada ya pili ya udaktari bingwa wa magonjwa ya watoto katika chuo kikuu kishiriki cha afya ya jamii na sayansi za tiba, Muhimbili.
S.L.P 65001, Dar es salaam.
Simu 0784 524 968.

Mimi ……Nimesoma /nimeelezwa yote yaliyoandikwa katika fomu hii na nimeelewa maana yake . Maswali yangu yamejibiwa, nimekubali mtoto wangu ashiriki katika utafiti huu.

---------- ----------

Tarehe Sahihi ya mzazi/mlezi

---

sahihi ya daktari mtafiti

APPENDIX III: Questionnaire

A: IDENTIFICATION:

1. Date of interview

2. Patient study code

3. Hospital Reg. No.

4. Source of information

    1. Parents ☐

    2. Guardian ☐

5. Date of birth

6. Age (weeks) ☐

7. Sex

    1. Female ☐

    2. Male ☐

8. Residence address

    a. District

    b. Street

B: PARENTS/ GURDIAN BACKGROUND INFORMATION:

9. What is your relationship with the infant?

1. Mother ☐
2. Father ☐
3. Guardian ☐

10. Marital status

1. Single ☐
2. Married ☐
3. Divorced ☐
4. Widow/ Widowed ☐

11. Occupation

1. Not employed ☐
2. Employed ☐

12. Occupation of spouse/ partner

1. Not employed ☐
2. Employed ☐

13. Number of partners

1. One ☐

2. Multiple ☐

14. Education level

1. Informal ☐

2. Primary ☐

3. Secondary ☐

4. Tertially ☐

C: INFORMATION ON HIV/ AIDS:

15. Where did you get information on testing the child?

1. Health workers ☐

2. Friends ☐

16. How do you feed your child?

1. Breastfeeding only (continue with question 18) ☐

2. Other feeds only (continue with question 20) ☐

3. Mixed feeding ☐

17. What will be the practice on breastfeeding after knowing the results of your baby?

1. Continue ☐
2. Stop ☐
3. Don't know ☐

Why?.....
.....
.....
.....

18. At what age did you stop breastfeeding your child? ……..weeks

Why?.....
.....
.....
.....

19. Appointment date for HIV testing (DNA PCR) which was given.....

20. Date when DNA PCR (DBS) test was done ……..

21. Date you received the results of DNA PCR (DBS) test ……

22. HIV status of the child

1. Positive ☐

2. Negative ☐

23. What makes the DNA PCR (DBS) results be available late?

1. Parents/guardians are not coming to the clinic on the appointment date ☐

2. Results are not yet back at the clinic ☐

24. At what age did the child start taking ARV? ……weeks

APPENDIX IV: Dodoso

A: UTAMBULISHO:

1. Tarehe ya mahojiano

2. Nambari ya utafiti

3. Nambari ya hospitali

4. Mtoa maelezo

    a. Mzazi

    b. Mlezi

5. Tarehe ya kuzaliwa

6. Umri (wiki)

7. Jinsia

    1. Mke

    2. Mme

8. Mahali anapoishi

    1. Wilaya

    2. Mtaa

B: TAARIFA KUHUSU WAZAZI/ MLEZI:

9. Mahusiano na mtoto

1. Mama ☐
2. Baba ☐
3. Mlezi ☐

10. Ndoa

1. Sijaolewa/ sijaoa ☐
2. Nimeolewa/ nimeoa ☐
3. Nimeachika ☐
4. Mjane ☐

11. Kazi

1. Sijaajiliwa ☐
2. Nimeajiliwa ☐

12. Kazi ya mwenza

1. Sijaajiliwa ☐
2. Nimeajiliwa ☐

13. Idadi ya wapenzi

1. Mmoja ☐

2. Zaidi ya mmoja ☐

14. Kiwango cha elimu

1. Sikusoma ☐

2. Primari ☐

3. Sekondari ☐

4. Chuo ☐

C: TAARIFA KUHUSU VIRUSI VYA UKIMWI NA UKIMWI:

15. Ulipataje taarifa kuhusu kupima UKIMWI kwa watoto?

1. M/ Wafanyakazi wa afya ☐

2. Rafiki ☐

16. Unamlisha nini mtoto wako?

1. Ananyonya maziwa yangu tu (endelea swali la 18) ☐

2. Anakula vyakula vingine tu (endelea swali la 20) ☐

3. Ananyonya na kula vyakula vingine ☐

17. Utamlisha nini mtoto baada ya kujua majibu yake ya UKIMWI?

1. Endelea ☐

2. Nitaacha ☐

3. Sijui ☐

Kwa nini?

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18. Umeacha kunyonyesha mtoto maziwa yako akiwa na umri gani? ……..wiki

Kwanini?.....

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19. Tarehe ya kipimo cha UKIMWI (DNA PCR) aliyokuwa amepewa.....

20. Tarehe kipimo cha UKIMWI (DNA PCR)
kilipofanyika……

21. Tarehe ulipopata majibu ya mtoto ya kipimo cha UKIMWI (DNA
PCR)…….

22. Majibu ya mtoto ya UKIMWI

1. Ana ☐

2. Hana virusi ☐

23. Nini kinafanya majibu ya DNA PCR (DBS) kuchelewa

1. Wazazi/ walezi klinik kufuata tarehe walizopangiwa ☐

2. Majibu yanakuwa bado hayapatikana klinik ☐

24. Mtoto alianza kutumia dawa za kuongeza kinga(ARV) akiwa na umri gani?

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