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Evaluation of HIV Seropositivity Among MDR-TB Adult Patients at Ndola Central Hospital

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Abstract

Objective: This paper evaluates HIV sero-positivity among Multi- Drug Resistance Tuberculosis adult patients at Ndola Central Hospital, Ndola, Zambia.

Research question: How many patients who were admitted at Ndola Central Hospital had HIV / MDR- TB co-infections, and how many died?

Method: A Retrospective Cohort study using the existing data and laboratory results in patient files and MDR TB register (sampling frame) were reviewed for all MDR TB patients whose culture and drug susceptibility test done at Ndola Central Hospital were assessed for HIV sero-status from January 2010 to June 2014. Review of records was done from 15/08//2014 to 22//o8/14 and sample comprised of 114 records which were available during the stated period using convenient sampling. A semi-structured questionnaire was used for data collection on the existing data base on patient's file and MDR- TB patient register. Data analyzed using Epi data version 3and bivariate analysis.

Results: The study revealed that 68.1% of the MDR TB patients were males, compared to 31.9% females; however there was no association between MDR TB and sex. The study showed that 42% of the respondents with MDR TB were co-infected with HIV. It also revealed that mortality among HIV / MDR TB co-infected patients was 36% and those negative accounted 12.7% showing an association between HIV sero status and MDR TB co-infection mortality.

Conclusion: HIV / MDR TB co-infection is a major public health problem needing urgent interventions, and proper treatment options for policy direction.

Keywords: *Evaluation, HIV / MDR-TB co-infection, Ndola, Zambia.*

1. Introduction

HIV/MDR TB co-infection is a major challenge in the management and control of tuberculosis globally. According to World Health Organization (WHO), they reported that in 2010 there were 350,000 people who died with active TB and HIV infection, meaning an increase between 2010 and 2011 (1). However in November 2012 UNAIDS reported that there had been a 13% reduction in TB associated HIV deaths in the last two years. The relationship between HIV infection and multi drug resistant MDR TB is not well understood, but there is currently no evidence supporting an association between MDR TB and HIV outside of institutional outbreaks of MDR TB (2). However, the high number of deaths from MDR TB in people who have both MDR TB and HIV can have devastating and demoralizing effects on communities, and this has already been seen in South Africa (3). In Zambia the magnitude of HIV / MDR TB co- infections is not well established as there is scanty literature and hence need to carry out a study on HIV / MDR TB co-infection. Analysis of records at Ndola central hospital showed that there had been an increase in MDR TB cases In view of the above, the study aimed at evaluating HIV / MDR TB co - infection among adult patients who were admitted at Ndola central hospital MDR TB ward from January 2010 to June 2014.

1.1 General Objective

To evaluate HIV seropositivity among adult MDR TB patients who were admitted at Ndola Central Hospital, Ndola, Zambia.

1.2 Specific Objective

1. To establish HIV / MDR- TB co-infections among adult patients at Ndola Central Hospital.
2. To determine the mortality rate among adult HIV/MDR TB co-infected patients at Ndola Central Hospital.

1.3 Research Question

1. How many patients who were admitted at Ndola Central Hospital had HIV / MDR- TB co-infections?
2. How many patients who were admitted at Ndola Central Hospital with HIV/ MDR TB co-infection died?

1.4 Definitions

1.4.1 General Definitions of Resistance

The category IV diagnostic criteria is defined as “chronic cases” i.e. still smear positive after supervised retreatment; proven or suspected MDR- TB.

A patient is determined to have drug resistant TB only through laboratory confirmation (culture and drug susceptibility testing) of resistance of one or more first line anti-tuberculosis treatment.

Multi-drug resistant (MDR-TB) tuberculosis that is resistant to at least Isoniazid and Rifampcin.

Drug resistance refers to patient pulmonary tuberculosis coughing out bacilli resistant to one or more anti-tuberculosis drugs.

HIV / MDR TB co-infection refers to having both HIV infection and either latent TB or active TB disease. When someone has both HIV and TB, each disease speeds up the progress of the other.

1.5 Justification

The investigator wishes to establish HIV sero-positivity in MDR- TB Co-infection as it is a major threat to the health of the nation. The investigation from the public health perspective will help in understanding the magnitude of the problem in Ndola in order to come up with good policy prescriptions in the prevention and control of HIV / MDR- TB co-infection. The study will also generate first hand data based on local experience and will strengthen planning and implementation. Furthermore the problem deserves new research as it is a public health problem which needs urgent attention due to its severity, contagiousness and expensive treatment modalities.

2. Literature Review

2.0 Disease Burden

The risk of death in MDR TB co-infected individuals is also twice that of HIV infected individuals without TB, even when CD4+ cell count (cluster of differentiation count) and antiretroviral therapy are taken into account (4).

World health organization reported that 14.8% of TB patients have HIV co-infection, and as many as 50-80% have HIV co-infection in parts of sub-Saharan Africa (5). The incidence of TB

associated with HIV is believed to have peaked at 1.39 million in 2005 and is now decreasing (6). However, globally, TB remains the most common cause of death among patients with AIDS, killing 1 of 3 patients (7). After decades of steady decline, the number of TB cases in the United States increased in the mid-1980s (8). However, analysis of trends focused on the period 2008−2013 suggests that globally, the proportion of new cases with MDR-TB was 3.5% in 2013 (20).Low CD4+ count on commencement of ART has been associated with opportunistic infections like tuberculosis. The CIPRA HT001 study demonstrated that starting ART at a CD4+ count of 200-350 cells/μL compared with waiting until the CD4+ count is <200 cells/μL reduced the risk of active TB by 50%.(9).

However, a meta analysis of the protective effect of ART on the development of TB demonstrated a 65% risk reduction in TB incidence across all CD4+ cell counts. A substantial reduction of 57% was seen in persons with CD4+ counts of >350 cells/μL, and the greatest impact was seen in those with CD4+ counts of <200 cells/μ accounted 84% reduction in TB incidence.(10)

In Zambia MDR TB prevalence was estimated at 1.8% new cases and 2.3% among re-treatments (26). Winston Zulu was a prominent global advocate first to speak out openly about the problems of TB and HIV co-infection (11). According to the National survey done from 2000 to 2011 revealed that there was no data available on MDR TB and HIV co-infection and only 65 MDR TB cases were notified and put on second line treatment according to WHO guidelines (24). Therefore there is need for the investigator to establish HIV sero-positivity among MDR TB patients.

2.1 Policy on Health Care Financing Related to HIV/MDR TB Co-Infection.

WHO 2010 stipulates that 1.3 million cases of MDR TB in the 27 countries with the highest burden of MDR TB will need to be treated between 2010 and 2015 (1). Currently the Stop TB Partnership's Global Plan to Stop TB now has as a target stating that by 2015, all HIV positive TB patients should be receiving antiretroviral treatment (12). PTN 052 study found that initiation of ART at a CD4 count of ≥350 cells/μL vs. waiting until the CD4 count dropped to <250 cells/μL, was associated with a 47% reduction in the risk of active TB (12). An analysis of financial implication and communication strategies for policy makers; in prevention and control of HIV / MDR TB co-infection will be important. The estimated cost of treatment requires several billions of dollars, which is far in excess of the existing level of funding. According to WHO 2010, all countries with a high burden of MDR TB, treatment per course of treatment for one person is more than 100% of the gross national income per capita (the cost of second line anti-tuberculosis drugs alone) is typically $2000 to $4000 per patient (1). The provision of anti retroviral treatment and anti TB treatment cause great challenges.

2.2 Financial Implications Associated With HIV/MDR Tb Co-Infection

Zambia is among high burden countries in Africa with HIV estimated death rate of 11000 in 2004 and 7600 in 2012 (22). In Zambia anti-retro viral drugs and anti tuberculosis drugs are usually provided for free by the Government, however challenges arise due to scarcity of resources in some areas due to increased demand and limited funding to procure the health care requisites. Demand for health care services is high in public hospitals as consumers are able to enter the market freely without any constraints and are able to consume goods and services at anytime they want, though most often quality is compromised. However, the private sector provide quality services at a fee, and only the elite are able to access and procure these services. Never the less, competition arises between public service providers and private sector and we find that, low quality providers price out high quality providers. Evidence suggests that failure to involve all care providers used by HIV/MDR TB suspects and patients hampers case detection, delays diagnosis, leads to inappropriate and incomplete treatment, contributes to increasing drug

resistance and places an unnecessary financial burden on patients (21). Engaging all relevant health care providers in TB care and control through public-private mix approaches is an essential component of the World Health Organization's (WHO's) Stop TB Strategy. Public-Private Mix for TB Care and Control represents a comprehensive approach for systematic involvement of all relevant health care providers in TB control to promote the use of International Standards for TB Care and achieve national and global TB control targets (22). The public-private partnership will focus on service provision, education and advocacy, infrastructure and capacity building by training health providers for skill enhancement. The measure of efficiency used in cost-effectiveness analyses is the cost-effectiveness ratio, which is the ratio of program costs to a health-related outcome such as lives saved from HIV/ MDR TB co-infection, life-years saved, or cases of HIV / MDR TB prevented. The Zambian government has a role of ensuring that production, regulation and distribution of drugs and laboratory requisites are available in all health care facilities and patient have access to these services.

2.3 Challenges of HIV/MDR TB Co- Infection

HIV/ MDR TB is associated with associated with high pill burden, cumulative toxicities, high mortality, difficult to diagnose, drugs used in the treatment of both conditions have overlapping toxicity and Immune reconstitution inflammatory syndrome (IRIS) and inadequate funding.

2.4 Statement of a Problem

Review of data highlights an increase in the prevalence of HIV/ MDR-TB globally. It is estimated that one third of the 40 million people living with HIV/AIDS worldwide are co-infected with TB (15). In Zambia a study done in southern province in Batoka revealed that 56% of TB patients were co-infected with HIV.(16) A study done at Ndola Central hospital revealed that 44% of patients admitted in MDR TB ward had Multi drug resistance TB, 33% had Mono resistance, while 22.6% had Poly resistance (14).

However no studies have been done on HIV / MDR TB co-infection to evaluate HIV/MDR TB co-infection and establish the disease burden and magnitude at Ndola Central Hospital. In view of the above the investigator would like to establish HIV/ MDR TB co-infection in order to explore and recommend interventions which will help curb the scurge and for policy recommendation. Hence the need to answer the research question which says; how many patients who were admitted at Ndola Central Hospital had HIV / MDR- TB co-infections? Also, how many of these patients who were admitted at Ndola Central Hospital with HIV/ MDR TB co-infection died?

3. Methodology

3.1 Research Design

A Retrospective Cohort study using the existing data and laboratory results in patient files and MDR TB register was reviewed at Ndola Central Hospital for all MDR TB patients whose culture and drug susceptibility test was done at Ndola Central Hospital and were assessed for HIV sero-status. Period under review involves patients who were admitted between January 2010 and June 2014. Data on the patient's characteristics were obtained from the MDR- TB treatment files and MDR-TB register.

3.2 Research Setting

The study was carried out at Ndola Central Hospital MDR TB ward. The site was purposively selected as it is a referral centre for MDR TB patients covering Copperbelt Province, North Western, Luapula, Northern and Muchinga Province in Zambia. Currently, there are only two Hospitals where MDR TB patients are admitted in Zambia and Ndola is one of them.

3.3 Study Population

A cohort of all MDR- TB patients who were admitted at Ndola Central Hospital for MDR TB between January 2010 and 2014 June in MDR TB ward were assessed for their HIV sero-status through review of records.

3.4 Sample Selection

Convenient sampling method was used as it involved the review of all records at the research site for MDR TB ward from January 2010 to June 2014.

Inclusion criteria: All MDR- TB patients' category IV cohort, who were confirmed with smear positive or negative, Notified, on treatment and/ or completed treatment at Ndola Central Hospital from January 2010 to June 2014 will be assessed for their HIV status.

Exclusion criteria: All MDR- TB patients category IV cohort, who were confirmed with smear positive or negative, Notified, on treatment and/ or completed treatment outside Ndola central hospital from January 2010 to June 2014 were not assessed for their HIV status.

3.5 Data Collection Tool

Semi-structured questionnaire modified from the Zambia National Tuberculosis and Leprosy Control program for category IV treatment MDR- TB guideline was used during review of records (see appendix II).

3.6 Data Collection Technique:

This study used a semi- structured questionnaire through observation to enhance proper data collection on the existing data base in the patient's file and MDR- TB patient register. Data was collected for three days from 15th to 22nd August 2014.

3.6 Sample Size:

The sample size was 114 adult patients who were notified since 2010 up to 2014 June this was a population study.

3.7 Ethical Consideration:

Consent was obtained from Ndola Central Hospital to review the register and patients' files. There was no risk and immediate benefits to those patients whose – files were reviewed. Consent was not obtained from patients whose records were reviewed as permission was sort from Ndola central hospital. Patients were not interviewed and were in a natural setting and hence were not exposed to emotional or physical harm since there was no contact with the investigator. Confidentiality and anonymity was maintained to all patients records as their names did not appear on the questionnaire, instead the serial number were used. Privacy was maintained as all patients records were reviewed in a private room and filled in questionnaires were kept under lock and key after each review.

4. Data Presentation and Analysis

4.0 Introduction

The study aimed at assessing HIV seropositivity among MDR TB adult patients who were admitted at NCH and analyzed the financial implications and recommended communication strategies for policy makers. A Total of 114 records were reviewed from January 2010 to June 2014 for MDR TB patients and assessed for HIV sero-status. The patients were admitted in the MDR TB ward at Ndola Central Hospital from 2010 to 2014 June who were assessed for their HIV sero status by reviewing of records. Category IV treatment cohort consists of a subset of patients recorded in category IV register who started category treatment during the specified time period (2010 to 2014 June).The findings of the study were based on analysis of data collected

from the patients' records and MDR TB register. The data was sorted out for completeness, categorized and coded. Data was analyzed using Epi Data version 3. The data was analyzed by univariate analysis to make frequency tables. The data was presented using tables, Pie chart and graphs for easy communication.

4.1 Demographic Data

Table 1: Sex n= 114

Sex	Frequency	Percentage
Male	77	68
Female	37	32
Total	114	100

This shows that 68% of the respondents were males, compared to 32% of females.

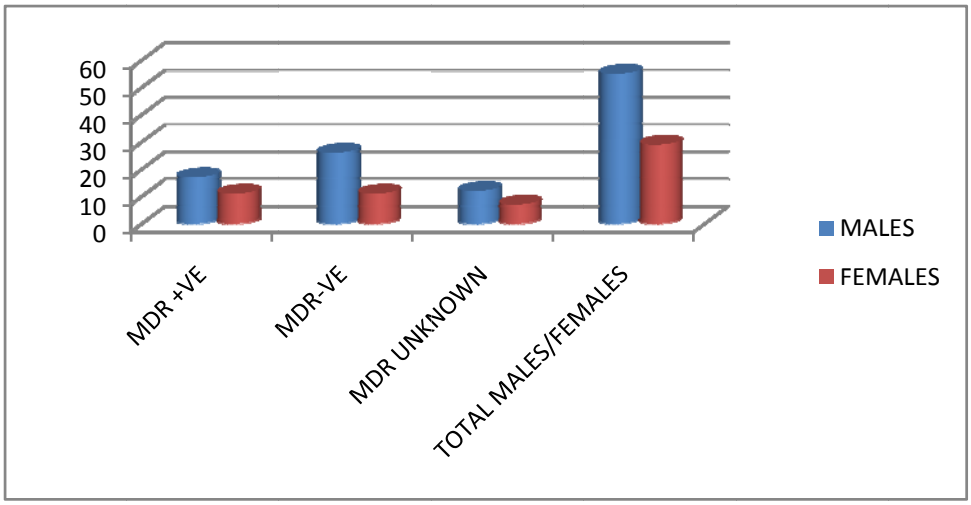

Figure1: MDR TB in relation to sex (n=114)

Figure1: Shows that 24% of the males were MDR TB negative, and 15% were MDR TB positive, while 10% of females were negative and 10% were positive. Those with unknown MDR TB status, males accounted 10%, while females were 5%.

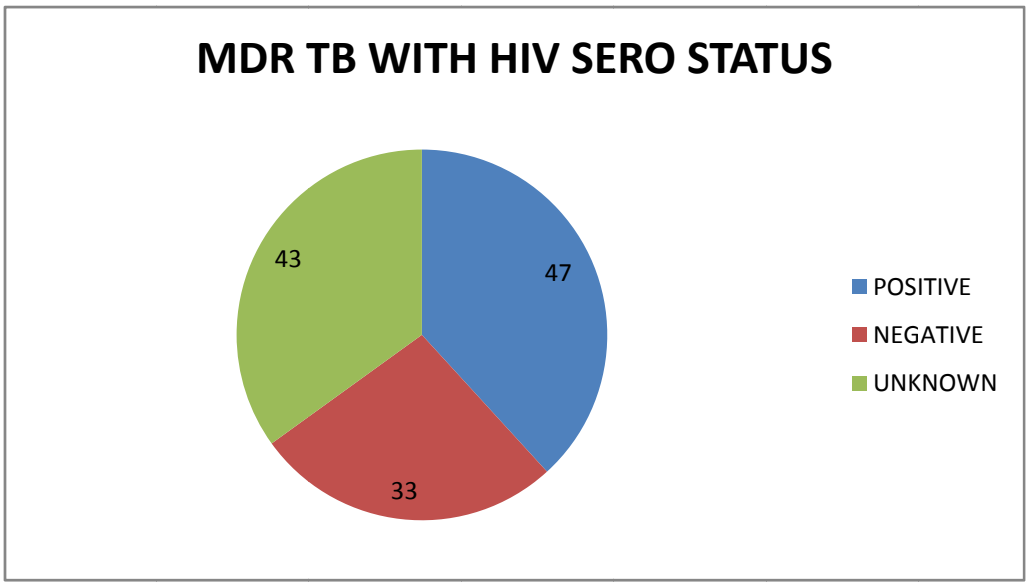

Figure 2: HIV sero-status with MDR TB

The above figure shows that, almost half of the respondents with MDR TB 47 (42%) were co-infected with HIV, while 43 (37.7%) were negative.

Table 2: HIV +VE / MDR TB co-infection mortality (n=47

HIV/MDR TB mortality	Frequency	Percentage
HIV /MDR TB	47	100%
M HIV +VE /MDR TB deaths	17	36%

The table above shows that among the 47 (100%) MDR TB patients who were HIV sero positive, 17 (36%) died.

Table 3: HIV sero-status and MDR Tb co-infection mortality (n=23)

HIV sero-status	Mult-drug resistance Tb mortality
Positive	17 (36.1%)
Negative	6 (12.7%)
Total	23(48.9%)

The above table shows that mortality was high 17 (36%) among MDR TB co-infected patients, than those who were negative 6 (12.7%).

Table 4: Drug Sensitivity Test (DST) Result (n=114)

DST result	Frequency	Percentage
mono resistant	28	33.3
Multi-Drug resistant	37	44.0
Poly resistant	19	22.6
Total	84	100
Missing Result	30	26.3
Total	114	100.0

This table shows that only 44% of admitted patients had MDR TB, 33% had Mono resistance, while 22.6% had Poly resistance to TB drugs, while 26.3% had incomplete records.

5. Discussion of Findings

The main objective of the study was to evaluate HIV/ MDR TB co-infection among adult patients who were admitted at Ndola Central Hospital in MDR TB ward from January 2010 to 2014 June. The Cohort study involved review of 114 patients' records and MDR TB register which were obtained from MDR TB ward at NCH. Review of records was done from 15/08/14 to 22/ 08/14 using a structured checklist. In this study the themes used to discuss the findings are: Demographic Characteristics, and HIV/ MDR TB co-infection.

The study revealed that 68.1% of the MDR TB patients were males, compared to 31.9% females. The findings further showed that 24% of the males had MDR TB negative, and 15% had MDR TB positive, while 10% of females were negative and the other 10% were positive. Those with unknown MDR TB status, males accounted 10%, while females were 5%. Never the less, sex was not associated with MDR TB (P value 0.704; Pearson chi-square). This finding could be attributed to poor health seeking behavior by most males and nature of work.

The study findings revealed that, almost half 42% of the respondents with MDR TB were co-infected with HIV, while those who were negative accounted 37.7%. These findings compliments findings done in South Africa which revealed that Out of the 1413 patients that tested for HIV infection, 554 (39.2%) tested positive (18). These findings could be higher than this as 38% of

the MDR TB patients; their HIV status was not known. Never the less research done in India revealed that HIV sero-positivity was 4.42% (19). Their findings were lower than the findings in this study and could be attributed to variation in risk factors and approach to interventions being employed in the prevention and control of HIV / MDR TB co-infection in each country. This study revealed that mortality among HIV / MDR TB co-infected patients was 36% and those who were negative accounted 12.7%. These findings are almost similar to a study which was done in South Africa which reported that 22.7% of HIV co-infected MDR TB patients had died within 2 years, and that excess mortality was higher in HIV infected, compared to HIV uninfected (18). This could be associated with weakened defence mechanism, drug toxicities, availability of opportunistic infections, drug interactions and poor nutritional status of HIV MDR TB co-infected patients. The study also reported that only 44% of patients who were admitted had MDR TB, 33% had Mono resistance, while 22.6% had Poly resistance to TB drugs while 26.3% had incomplete records. This shows that Zambia is among the nations with HIV/ MDR TB co-infection which needs urgent attention and prioritization.

5.1 Communication Strategies Needed to be Developed to Curb HIV/MDR TB Co-Infection.

Strategies to prevent and control MDR TB co-infection should focus on public awareness campaigns on dangers of these diseases, prevention and control campaigns in the community through social / mass media. I will ensure that communities are sensitized and are empowered on MDR TB co-Infection. Community mobilization done to identify and solve health problems like MDR TB co-infection, develop policies and plans that support individual and community health efforts. Community based media should be used such as local news papers, local radio station and posters, drama, concerts, rallies other mass media channels to disseminate the information etc.

Good cost effective preventive strategies for HIV / MDR TB co-infection should focus on condom social marketing, peer education, school based education programs, mass media campaigns and community based programs. Moral persuasion is cardinal to reset behavior norms to a better standard of care and change will be self sustaining as it requires strong advocates at local level (22). At the same time there is need to improve partnership with private and communities by exploring the use of alternative services delivery approaches such as community-home based care to ensure early diagnosis, appropriate referral and prompt care for each disease.

5.2 Dissemination of Findings

The findings of the study will be disseminated to Ndola Central Hospital, and Ministry Of Health

5.3 Strength/ Limitation of the Study

Findings may be generalized as it is a population study. It also forms a basis for developing of other related studies. Data generated can be used for decision making by policy makers as it is based on local lived experiences.

The data may be of poor quality due to incomplete recording system. Lack of adequate resources such, as funds and the time frame, in which the capstone project was to be completed, were the major limitations. Ndola has been selected for convenience purposes.

Conclusion

HIV / MDR TB co-infection is major public health problem in Zambia due to resistance to first line treatment which is cheaper. The interaction of anti Tb drugs and ARVs also contributes to increase in MDR TB as there are overlapping toxicities which contributes to poor adherence. MDR TB co-infection is associated with high mortality and there is need to ensure early diagnosis and prompt case management. Contact tracing is important in managing exposed

contacts. Public- Private Partnership and community sensitization on importance of early seeking behavior must be emphasized and HIV /MDR TB must be treated as an emergency. Therefore HIV/ MDR TB co-infection is a priority area among other public health problems in Zambia. This means that we need strong political commitment, across multiple government sector and private sector to increase partnership among various stakeholders. At the same time funding should be improved towards interventions for HIV/MDR TB co-infections. This requires capacity building and training of health care providers towards MDR TB co-infection management. New innovations are required and this calls for research to come up with evidence based literature to help in development of policies and strategies that can help to curb the scurge.

Recommendations

The linkage system for ART and TB services should be strengthened, and skilled workforce should be available to provide leadership to other health care providers in MDR TB wards.

There is need to scale up rapid testing and detection of all MDR TB cases and patients should have prompt access to appropriate MDR- TB care.

The government through MOH should ensure that there is good supply of quality drugs for HIV/ MDR TB co-infection treatment.

MOH/ NCH need to implement appropriate TB control measures to minimize risk of transmission through advocacy and partnership with community and other stake holders if morbidity and mortality of HIV/ MDR-TB/ co-infection is to be controlled.

There is need to ensure that health care providers are trained in the management of HIV/ MDR TB co-infected patient to monitor toxicities and provide quality care if mortality is to be reduced. There should be good leadership and planning to develop strategies and monitor interventions. Infection prevention protocols should be disseminated to all health care facilities and the community at large. The government should ensure availability, accessibility, affordability and acceptability of HIV/ MDR TB health care package.

The government should support research for new insights and innovative solutions to HIV/ MDR TB co-infection.

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RUNNING HEAD: HIV/ MDR TB CO-INFECTION 25

Appendix I: Budget

ITEM	QUANTITY	UNIT COST	TOTAL COST
1.Stationary			
(a) printer toner	1	K1,200	K1,200
(b) A4 paper	10 reams	K35	K350
(c) Pens	10	K1.50	K15
(d) Pencils	10	K1	K10
(e) Rubbers	5	K3	K15
(f) Tipex	4	K8	K32
(g) Files	5	K5	K25
(h Laptop	1	K7.500	K7.500
(i) Flash disk	2	K200	K400
(j) Stapler	1	K50	K50
(k) Staples	1	K20	K20
(l) Scientific calculator	1	K80	K80

(m) Flip charts	2	K40	K80
(n) Markers	2	K40	K80
(q) Bags	2	K60 X 2	K120
(r) Printer	1	K2,000	K2000
Subtotal			K11 977
2. Services			
(a) Statistical consultancy	1	K2,500	K2,500
(b) Data analysis package (SPSS and Epi-infor)	2	K500	K1000
(c) Binding final Reports	3	K700	K2,100
Subtotal			K5600
3. personnel			
(a) Principal researcher	1	K100 × 20 days	K2,000
(b) Transport to research site-local	4	K40 × 20 days	K6,400
(c) Payments Ethics committee	1	K 1000	K1000
Subtotal			K9,400
Total			K26,977
Contingency 10%			K2997.70
GRAND TOTAL			K29,974.70

Budget Justification

A total of K29, 974.70 (Twenty nine thousand, nine hundred and seventy four, seventy ngwee) will be required for stationary, services, personnel and travel expenses in order to carry out this research project successfully.

Appendix II: Semi-Structure Questionnaire (HIV/MDR TB)

REVIEW OF RECORDS RETROSPECTIVELY

DATE ……..
PLACE OF INTERVIEW ……..
NAME OF INTERVIEWER ……..
SERIAL NUMBER ……..
Demographic data: sex F / M Age ……..……..……
Disease classification pulmonary …… / extra pulmonary……..……..……
Date of treatment ……..
Type of patient ……..
Treatment category ……Initial…….or changes in treatment……...
Category IV card suspect ……. confirmed ……..…….
Reasons for Cat IV …… start date……..Completed……
Registration Group ……...
Sputum microscopy result …… date ……..…….
Sputum culture ……date ……...
DSR result …… date ……..……
VCT Results Negative ……. Positive ……..……..
DOTs administration supervised …… not supervised…...drug not taken…. ……..
Outcome; cured …… completed……Died …….failed……...
Defaulted ……...Transferred out ……..……