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A study of the cost of treating HIV/AIDS patients at the W. F. Knobel Hospital, Capricorn District, Limpopo Province

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A STUDY OF THE COST OF TREATING HIV/AIDS PATIENTS AT THE WF KNOBEL HOSPITAL, CAPRICORN DISTRICT, LIMPOPO PROVINCE

By Dr Dimakatso Victoria Moloi

A research project report submitted in partial fulfilment of the requirements for the

Masters Degree in Public Health (MPH)

Area of concentration: Management

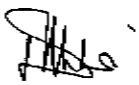
In the School of Public Health

Faculty of Health Sciences

UNIVERSITY OF THE WITWATERSRAND

DECLARATION

I, Dimakatso Victoria Moloi, declare that this research report is my own work. It is submitted for the degree of Masters in Public Health at the University of Witwatersrand, Johannesburg. It has never been submitted before for any degree or examination at this or any other university.



Dimakatso Victoria Moloi

Date: 15/10/2007

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My supervisor Professor Mary Ross for her patience, support and encouragement when I felt I could not go on any more.

My husband Jerry and family for the disruption I brought in their lives and not being there when they needed me.

The staff at W.F.Knobel hospital who had to work overtime to search for files in an environment where the manual system was still being used for storing patient records.

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For Prof Bekker at the MRC for the insight I gained on statistical analysis.

Lastly I wish to thank the God Almighty for having given me the courage to tackle and travel along the long and winding road which I had underestimated when I embarked o n the course.

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THE LIST OF ABREVIATIONS

HIV: Human Immunodeficiency Virus

AIDS: Acquired Immune Deficiency Syndrome

ARVs: Anti-retroviral drugs (Drugs used to treat HIV infection)

Variable costs: Costs which depend on unit usage or output

GDP: Gross Domestic Product

Opportunistic infections: Infections which occur in conditions of lowered immunity e.g. HIV infections

HIV positive: Patients infected with the Human Immunodeficiency Virus

CD4 count: The number of CD4+ lymphocytes per ml

PHC: Primary Health Care.

Triple therapy (and HAART): Anti-retroviral drugs provided in a combination of three drugs each having a different pharmaceutical action rather than a single drug (HAART means highly active anti-retroviral therapy)

Post Exposure Prophylaxis (PEP): Provision of prophylaxis in the form of ARVs to victims of rape and occupational exposure e.g. needle-stick injuries

Prevention of Mother To Child Transmission (PMTCT): Provision of ARVs in the form of a single dose of Nevirapine to both the mother and infant during delivery for mothers infected with HIV

WHO: World Health Organisation

STIs: Sexually Transmitted Infections

BOR: Bed Occupancy Rate (in state hospitals this is estimated as the number of patients in the ward at midnight divided by the number of beds available expressed as a percentage)

ALOS: Average length of stay (in state hospitals this is estimated by subtracting the admission date from the discharge or death date)

TBCP: Tuberculosis Control Programme (as detailed in the National Health Department official guidelines)

SUMMARY

Purpose: This study documents the cost of medicines for in- and out-patient visits that were HIV-related at WF Knobel hospital during 2002.

During the study, the ARV programme had not yet commenced at this particular hospital. This study will therefore form a baseline for medication costs before the ARV treatment programme was implemented and the information could be used for comparison after the treatment programme commenced.

Aim: To estimate the cost of medication for visits and admissions related to HIV infection at WF Knobel Hospital, a district hospital in Limpopo Province during the pre-ARV era.

Methods: This study was a retrospective review of patients' medical records. Patients were identified through a laboratory printout of all the ELISA tests for HIV infection that were performed from 1 January until 31 December 2002. From this list those testing positive were identified and included in the study. Based on this list which also contained the file numbers, records were accessed from the filing system in the records department. Once files were obtained, the medication per file was noted down and the completed list was taken to the pharmaceutical department of the tertiary hospital in the province namely Polokwane hospital, where tender prices paid for individual drugs were obtained.

Results: One hundred and eight files were located and examined, out of a total of 140 clients who were diagnosed as HIV positive and identified for inclusion for the year 2002. The remaining files (23%) could not be found. Seventeen (16%) of the 108 patients were outpatients.

There were 23(21%) repeat visits and 6 patients (5.5%) visited three times. This made the total number of episodes 137. The longest hospital stay was 85 days.

Total inpatient days was = 1348
The average length of stay for admissions was 1348/119 = 11.33 days (range 1 to 85). The data was skewed to the right, and the median length of stay was 8 days.

The highest cost of medication was R394.22 and the lowest cost was R2.24. The highest cost was related to an admitted patient whilst the lowest was for an outpatient. There were 17 outpatients and 91 inpatients. The median drug cost for in-patients was R202.64 (R11.06 – 394.22). The median drug cost for outpatient visits was R77.28 (R2.24 – R154.52).

The most expensive cost was for TB treatment and the lowest for abdominal pains.

Discussion and conclusions

The cost of medication was not related to length of stay except with PTB. There was a need to improve record keeping since some of the files could not be retrieved. The quality of medical records was of poor quality with a lot of data missing. It was evident from the finding that the medical staff were no treating opportunistic infections in line with National guidelines.

It was recommended that clinical staff should undergo training in order to improve on the clinical management and proper record keeping. Further studies should be conducted so as to be able to compare the results with other studies conducted elsewhere and to be able to compare in future once HAART programme has commenced.

INTRODUCTION

The aim of this study has been to document the average costs of medicines prescribed per outpatient visit and the average cost of medicines prescribed during an inpatient stay for HIV-related visits and admissions during the pre-antiretroviral era at the WF Knobel hospital during 2002.

This information can be used as a baseline for comparison with drug costs during first visits or admission after introduction of ARVs.

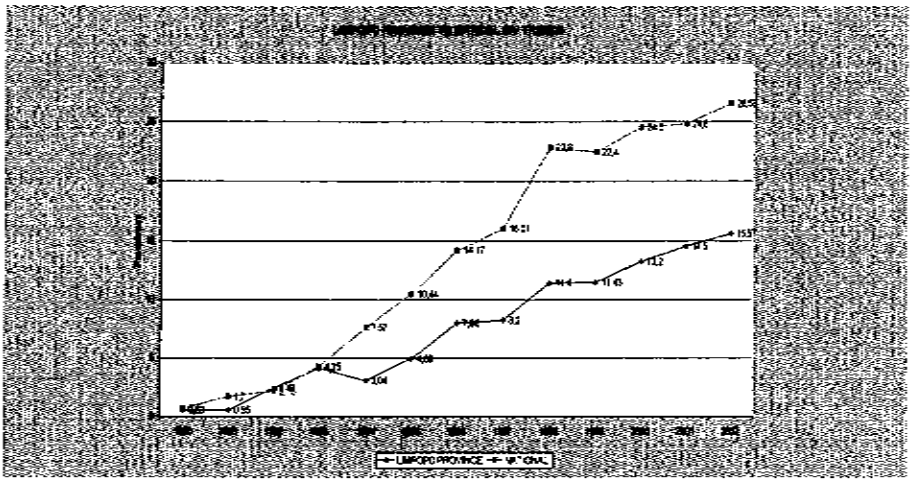
In this report the methodology is described and the results are presented followed by discussion and recommendations.

BACKGROUND AND LITERATURE REVIEW

HIV/AIDS is continuing to be a serious pandemic with the number of afflicted growing from year to year worldwide. The latest statistics from the National HIV and syphilis ante-natal sero-prevalence survey in South Africa 2004(1) indicate that more than 28.5% of the public sector ante-natal attendees in South Africa are infected with HIV. One of the service providers that is adversely affected is the Department of Health due to the mortality and morbidity of HIV/AIDS. This will be manifest by the increase in the number of consultations in health facilities and admissions in hospital.

When this study was conducted in 2002, the HIV ante-natal prevalence in Limpopo was 15.57% as compared to the National prevalence which was 26.53%. Figure 1 shows the ante-natal visit prevalences in Limpopo province and the national prevalences between 1990 and 2002, illustrating the relative trends in the prevalences.

Figure 1: HIV ante-natal seroprevalences in Limpopo 1990 - 2002



SOURCE: Limpopo Provincial Government Department of Health and Welfare 2002 Summary Report Annual HIV Antenatal sero-prevalence survey in Limpopo. Directorate Communicable Disease Control, Epidemiology, Expanded programme on Immunisation, Environmental & Occupational Health

In 2002 the Minister of Health was faced with the dilemma of whether or not to provide ARVs at public sector facilities. It was the National Department of Health's intention to provide a complete package of care to those infected (2).

The same dilemma affects health managers when they compile their annual budgets for health services, which will obviously include caring for patients with HIV and AIDS.

The dilemma concerning provision of ARVs originates from the high cost of the drugs. This was aggravated by the fact that generics could not be manufactured on the basis that the patent of the drugs had not yet expired. According to Coovadia(3), intellectual property rights and the required profits of drug companies stood in the way of third world citizens' needs for medication for HIV.

After a lengthy battle between the Minister of Health and the Pharmaceutical Manufacturing Association, Act 90 of 1997 was finally passed on 2nd May 2003. Among other sections of the Act is one allowing for parallel importation of drugs, making ARV generics more affordable.

In the interim, a report was compiled by the Centre for Actuarial Research (Care) at the University of Cape Town (4). The study and the report, *The Costs and benefits of Preventing and treating HIV/AIDS* were commissioned

by the Treatment Action Campaign to calculate the costs and benefits of providing treatment with ARVs.

In July 2002 government established a Joint Health and Treasury Task Team to investigate issues relating to the financing of an enhanced response to HIV and AIDS, based on the Strategic Plan as further elaborated in the in the 17th April 2002 Cabinet statement and the subsequent Cabinet statement of 9 October 2002 and 19 March 2003 (5).

A particular focus of the Task Team was on the second component of the Strategic Plan, namely treatment, care and support for those infected and affected by the pandemic.

In July 2003 a report was released which indicated the reluctance of the Department of Health to release the outcome of the study they conducted which supported the fact that they could afford an AIDS drug treatment programme that could prolong the lives of 1,7 million people (5)

Subsequently, on the 8th August 2003 Cabinet decided to instruct the Minister of Health to make ARVs available to HIV-infected people with a CD4 count of less than 200. This followed Cabinet receipt of the Report of the Joint Health and Treasury Task Team (JHTTT) that was charged with examining treatment options to supplement comprehensive care for HIV and AIDS in the public health sector (5).

This report provides options to support the strengthening of the second component of the country's 5 year Strategic Plan, including scaling up current policy interventions, and integrating additional interventions, including the option of introducing anti-retroviral therapy for people with AIDS.

In order to assist provinces in the country to implement the HAART programme an Operational plan was produced in November 2003(6).

The AIDS epidemic poses another big challenge regarding monitoring and evaluation of health services. Hospital Performance Indicators are used by the Department of Health as a tool for measuring performance and to ensure effective and efficient utilisation of funds.

The important indicators include average length of stay (ALOS) as well as bed occupancy rate. Studies need to be conducted to estimate the kinds of patients who contribute to high rates of admission and length of stay.

HIV & AIDS programmes in the public sector

Management of HIV/ADS in the public sector is guided by HIV/AIDS and STI Strategic Plan for South Africa, 2000-2005(7). There are fifteen (15) goals in the plan. GOAL 8 reads as follows: Provide adequate treatment, care and support services in communities.

This study will be focussing on this goal. Toward this end The Department of Health has come up with programmes targeting the involvement of communities towards those who are already sick and cannot look after themselves.

This is where the programme of Home Community Based Care comes in The Department of Health published guidelines toward this programme in 2001 (8).

This programme' aims and objectives are as follows:

- To shift the emphasis of care to the beneficiaries
- To ensure access to care and follow-up through a functional referral system
- To integrate a comprehensive care plan into the informal, non-formal and formal health system
- To empower the community/family to take care of their own health
- To empower the client, the carer(s) and the community through appropriate targeted education and training
- To reduce unnecessary visits and admissions to hospitals
- To eliminate duplication of activities and enhance cost-effective planning and delivery of service
- Be proactive in approach

Treatment and care

Karstaedt (9) has identified four important steps in the quest to provide adequate care for HIV in the public sector. The paper was written before provision of ART. They are as follows:

(a) Improving planning for the provision of care

(b) Decentralising care

(c) Developing and using standard protocols

(d) Seeking ways to reduce cost of drugs

This study will focus on the costs of pharmaceuticals as background information for decision makers for the purpose of deciding whether (non-ARV) costs for medicines have been influenced by the introduction of ART and if so by how much. The study will also show the need for development of treatment protocols.

The period during which this study was conducted was January to December 2002. During this period ART was not provided in public facilities in South Africa. This study will still be useful once ARV treatment is provided as it will enable the medicines cost per outpatient visit and medicines costs per inpatient admission to be compared before and after the introduction of ARVs. One of the challenges regarding clinical management of HIV-infected patients is the lack of follow-up by health workers. This was manifested in the PMTCT programme. This problem results in lack of knowledge concerning how many times patients present to a health facility with opportunistic infections, and it therefore becomes difficult to assess the cost thereof. Most of the time there is no track record kept of patients who were diagnosed. The exception is where there are "wellness" or "hope" clinics.

This study concerns HIV positive patients who visit public facilities at a hospital in Limpopo Province and receive treatment for opportunistic infections, in other words they did not receive anti-retroviral drugs.

Before cabinet approved provision of ARV treatment in 2003, there was much controversy in the country regarding the issue of treating HIV/AIDS. There was ongoing debate regarding whether to treat or not to treat the infection with

ARVs. There was also debate about whether treating opportunistic infections is more cost-effective than treating the viral infection itself.

The cost of treating the symptoms

According to Cowlin(10) a number of studies were conducted by Medscheme and demonstrated that hospital treatment arising from complications, or the AIDS-defining illnesses, was more expensive than providing double or triple ARV therapy for the patients life.

They further argue that this is because most of the patients are in the advanced stages of the disease, in other words their CD4 count is less than 350, which means then that patients should rather be treated earlier. However, in practice, most of the time, patients request testing when the CD4 is already low and at this stage patients present with symptoms.

The medscheme experience

Cowlin (10) further indicated that, in the early years of the HIV epidemic, Medscheme rejected all identifiable HIV/AIDS claims, except for pathology. Years later, when the viral load test and CD4 count test were developed, payment for treating HIV related illnesses was then approved.

Subsequently, it was found that those individuals submitting claims for either CD4 counts or viral loads used 300% more medicine than the average for the scheme. It would appear that ARVs were dispensed, but claimed for under the guise of other medication. The number of CD4 counts, which were ordered, substantiated this premise. This economic analysis was carried out from the perspective of the funder (Medscheme) and not from a societal perspective.

In-patient vs. out-patient care

Rietmeijer et al (11), conducted studies at Denver Health and Hospitals, which is public system delivering comprehensive health care to mostly indigent residents of the city and county of Denver, in the United States.

They compared the out-patient with in-patient utilisation of services by HIV/AIDS patients for 1990. They studied 812 infected patients who presented during 1990 and were followed up over a period of 13 years. Here they found that 57% of patients presented for in-patient care and 47% for ambulatory care, and the total cost for both was $7 858 690 for the year 1990.

The limitation of that study as compared to the study conducted for this current project is that the patients were receiving both ARVs as well as treatment for opportunistic infections. In the present study only treatment for opportunistic infections was studied since ARVs were not yet provided in public hospitals in South Africa.

The second limitation in comparison of the Denver study with the current study lies in the comparison of the monetary values, since the USA study is in dollars whilst that in South Africa is in Rands, the exchange rate of which is difficult to compare. However this point will be taken into consideration in the discussion of the study.

The Baragwanath study

One study, which is more relevant to the study being conducted, is the one conducted by Karstaedt *et al.* (12), in which the in-patient as well as out-patient costs of treating opportunistic infections were investigated.

(a) They are similar in the sense that they were both conducted in South Africa, hence the same monetary value.

(b) Secondly patients were not placed on ARVs, since the venue is a public hospital in South Africa.

(c) Thirdly, no prophylaxis had been given against *Pneumocystis carinii* infection or tuberculosis.

The differences are as follows:

(a) The Baragwanath study considered all costs, namely laboratory costs, drugs, staff, other consumables, running costs like equipment and administration.

(b) They studied a cohort of patients from the outpatient department who were followed for a year whereas this project looks only at all the patients who presented to the hospital for medical treatment, both as outpatients and patients.

(c) Some drugs like acyclovir are not routinely available at the hospital under study, in line with the essential drug programme.

In another study with a similar design to this study, Mkele et al (13), looked at the economic implications of drug treatment for HIV/AIDS and treatment of opportunistic infections in South Africa, the recommended drugs and their costs both for ARVs and for treatment of opportunistic infections. The drugs were costed both in the public and private sector. A spreadsheet was created to facilitate cost extrapolation versus current and future expenditure. The estimate in 1999 for triple therapy ranged between R9 5000.60 and R18 468.60 per patient per year for life, depending on the regimen used.

The paper highlighted among other things, the importance of providing cost for triple therapy rather than mono-therapy. The paper, in conclusion, recommended that pharmaceutical companies had to look into the issue of reducing costs of ARVs.

Regarding management of opportunistic infections, the paper indicated that in a year a patient would consult four times a year with the different types of opportunistic infections and it would cost up to R6 729.11 per patient per year to treat these opportunistic infections.

The impact of HIV/AIDS on hospital services was also raised by Cabral (14) as early as in 1993. The author focussed his attention on rural hospitals in Africa where resources are limited. He forecasted that the epidemic would lead to competition with and disruption of other PHC essential services.

Regarding data collection, this study is also intended to indicate whether the selected health facility does adhere to National Guidelines on clinical management of HIV & AIDS.

A similar study was conducted by Haile in Cape Town (15) where the aim was to characterise the local HIV-inpatient population and related expenditures within a secondary acute hospital. In that study it was found that record keeping was of a poor nature, as a result the study objective was based only on a very small sample.

Regarding provision of ARV drugs in the public sector, one of the first clinics in the country was the ART clinic which is situated in Gugulethu Community Health Centre (16). A study was conducted on ART being provided to patients with a CD4 count of 200 and less. Becker *et al* identified drug pricing and staff salaries as the major cost-drivers of the total cost. On the personnel costs, medical officers accounted for 39.3%, nurses 16%, lay counsellors 15.7% and specialist medical support and training 29%.

Viral load and CD4 cell testing contributed 10% of total attributable expenditure. They also showed that drug procurement accounted for 61% of the attributable cost of adding ART to the existing primary care HIV management programme. Their plan was to hopefully access UNAIDS preferential pricing which will reduce the cost of the initial regimen to approximately 50% of current retail pricing. It is assumed that availability of generic formulations could reduce the cost of the initial schedule by an additional 50% to an approximately R350 per month.

A number of papers were presented at the International AIDS conference in Barcelona addressing the cost of treating HIV/AIDS. One of the papers was from Zimbabwe(17) where different models were looked at as far as funding for HIV/AIDS was concerned.

The objective of the development of the cost-effectiveness model was to assist decision-makers in the private sector in assessment of affordability of different types of HIV/AIDS prevention & care programmes compared to standard medical care without specific interventions targeted at HIV/AIDS.

The model should:

- Describe the main costs and benefits of running HIV/AIDS prevention and care programmes within a company environment
- Allow a comparison of these existing medical care
- Be easy to use and understand as a policy planning tool by company managers, labour union leaders and health care providers.

A simple cost-analysis model, based on a decision –tree analysis principles was used. The main components were patterns of HIV infection and outcomes; health treatment cost and employment related costs. Three scenarios were created and costed namely: Home base care; Prevention/Care without ARV and lastly Prevention/Care with ARV. The costs in each scenario were compared with benefits that would be achieved. This is a very important lesson health managers have to take into consideration when planning to fund the different approaches.

Another paper presented at the conference was a study which was conducted in China by Liu *et al* (18) which focussed on the rationale for using syndromic management of Sexually Transmitted Infections in resource limited settings. A total of 406 men complaining of genitourinary symptoms were interviewed.350 of them complained of urethral discharge or dysuria symptoms. Out of these urinary samples could be collected from 347.The results showed that 227 men were correctly treated for *Neisseria gonorrhoea* and *Chlamydia. trachomatis* while 104 were over treated. Over diagnosis and other treatment are considered the major disadvantages of syndromic management. However the study has indicated that problems of over treatment and incorrect treatment using the modified syndromic management were less than those of using the conventional treatment in the clinics.

Govender *et al* (19) conducted a study at Groote Schuur and Conradie Hospitals in the Western Cape province. The aim was to study both the direct cost of treating HIV and AIDS as well as a study of the Quality of Life of patients attending the facilities. The cost part of the study looked at all the aspects of costing i.e. personnel, drugs, laboratory tests, radiology, catering

and consumables. The important role played by tuberculosis is mentioned both in terms of being poorly controlled as well as being a major cost-driver.

The study highlighted limitations as far as evaluation of the effectiveness of HIV/AIDS care was concerned since there was only palliative treatment. This was the case then because the study was conducted in April 2001, before HAART was made available in the public sector. The evaluation was in terms of the opportunistic infections prevented or treated, days saved from hospitalisation, and so on.

This study is not focussing on the use of HAART, but it would be interesting to compare the costs incurred before and after the introduction of HAART, which hopefully will have started by 2006. Apart from the fact that hospital costs were estimated, travel costs were also included as a way to measure the impact of healthcare utilisation on the patients' life.

Recommendations that were made were as follows:

- There was a need for treatment guidelines
- The procedure for referral and discharge of patients needed to be improved.
- A need for improved focus on primary health care
- The need to collaborate HIV and TB
- A need for change in the community and staff attitudes.

In a study by Tramarin *et al* (20), the epidemiological, clinical and economic impact of the HIV epidemic in Italy prior to and after the introduction of HAART were described.

The use of treatment guidelines has also contributed to reduction of costs in the final analysis, as shown by Purdum *et al* (21). This method is popularly used in limited resource settings where laboratory confirmation of diagnosis would be too costly. The Department of health in South Africa is also advocating the use of a treatment protocol for the ART programme (22). Treatment protocols are also used for the TB Control programme (23),

management of opportunistic infections (24) and Post-Exposure Prophylaxis programme (25).

Purdum *et al* (21) furthermore compared treatment outcomes for patients who were treated according to treatment guidelines for HAART with those not using guidelines. The finding was that patients who were treated according to guidelines ended up with more prescriptions and higher drug costs while at the same time they demonstrated longer time-to-inpatient admission controlling for other factors. This then means that in the short term the costs of medication will rise, however the quality of life for these patients would be improved.

An similar study was conducted by Demana at Pietersburg hospital (26). The difference between the two studies is that the present study is looking at only at medical treatment whereas the study by Demana was also looking at the following:

- Professional fees
- Laboratory fees
- Drugs
- Procedures
- Radiology
- Facility fees

The author came to the following conclusions: The highest medical cost was R3,276 and was for treatment of meningitis. It was followed by TB which cost R626 per admission episode. If one compares this study with the study under discussion, one will notice a big discrepancy. One of the factors related to the different costs could be that Demana's study was based on 2002 drug prices.

Concerning diagnosis of Tuberculosis, in a study conducted by Murray *et al* (27) it was also demonstrated that problems existed with regards to diagnosis of pulmonary tuberculosis. The study compared in-life with post-mortem diagnosis of cause of death and identified the lost opportunities for in-life diagnosis of lung disease. The overall aim of a further study reported by the same authors (27) was to entrench TB Performance Based Process Review

(PBPR) and to evaluate the Impact of this programme. During the course of the project, many doctors and other health professionals were trained on the PBPR programme through attendance at various presentations, as well as at on site mine visits and containing professional development exercises. The outcome was such that there was a decrease in the proportion of missed cases of PTB from 655 in 1999 by 54% in 2003 in the mining industry. It is recommended that a training programme along similar lines could be introduced in the public sector to improve diagnosis and management of common HIV related lung diseases which the present study indicated to be important opportunistic diseases.

In a letter by Peter *et al* (28), the burning issue of treatment of patients infected with HIV was raised as far back as 1991. These authors compared the cost of treating HIV infected patients admitted in a medical ward versus the cost of other medical patients not infected with the virus. The first part of the study compared the length of stay of HIV infected patients against those not infected. The duration for 35 HIV positive patients was eight days as compared to those of 81 HIV negative patients which was five days. The difference was statistically significant (p=0,08). In the second part of the study the median daily cost was compared between 40 medical admissions and 20 AIDS patients after adjusting for length of stay. The drug costs were R38.59 and R60.59 per day respectively and this difference was statistically significant.

Hussey *et al (29)* also indicated in a letter their concern regarding provision of a comprehensive package of care to children infected with HIV. This letter was also written in 1992 in the pre-ARV era. The letter was based on a study conducted on 20 cases of children who were seen at the Red Cross Hospital where each of them recorded a 2.1% admission rate. The mean hospital stay per child was 54 days and the mean hospital stay per admission was 26 days. This was far in excess of the mean of 5 days for general paediatric patients at the hospital. The pharmaceutical cost per admission was R373 compared with R31 for general paediatric patients. The purpose of the letter was to advocate for provision of ART after clinical trials have been conducted to make informed decisions on the use of intravenous AZT and other immunoglobulins.

Nutritional supplementation

Treatment protocols for patients infected with HIV also include nutritional interventions (30). The Department of Health has come up with national guidelines meant specifically for HIV positive patients as well as TB and other chronic conditions as a way of ensuring that the special needs required by these groups of people are identified and appropriately addressed. Patients may be unable to swallow due to conditions like oesophagitis. The guidelines also address the following factors:

(a) lowered food intake

- Poor appetite due to infections and depression or anxiety.
- Poor sense of taste due to medication.
- Lack of money for food
- Isolation at public events affecting the eating behaviour of the infected persons.

(b) physical problems

- Infection deteriorating the lining of the gut.
- Malabsorption due to inability of the gut to take up nutrients.
- Diarrhoea as a result of malabsorption leading to further loss of weight.

Broomberg *et al* (31) also looked at the economic impact of HIV/AIDS in 1991 as a model for projection. Their research looked at the possible impact in developed countries against those in developing countries with the aim of identifying contributory factors. They mentioned the limitations characterising almost all research conducted until then which were namely: limited policy applicability of most studies, highly variable results and the very limited scope of most studies.

They further pointed out the fact that burden of disease data may be helpful towards policy formulating but not useful in determining allocation of resources. Regarding developed versus underdeveloped countries, they found that studies done in the US have shown the cost of treating HIV/AIDS not differing much from the cost for other chronic diseases e.g. end-stage

renal failure. For developing countries there is limited data available. One of the studies was conducted in Zaire and Tanzania showed that total expenditure on HIV/AIDS constituted a far greater proportion of per health capita spending than in developed countries.

The document was comparing different economic models. In some the cost remains static between 1991 and 2000 whereas the one predicted by Broomberg *et al* show that the cost will more than double within ten years' time.

Other researchers also looked at future projections on costs for treating HIV and AIDS. Girdler-Brown (32) conducted a cost-analysis study on the cost of Highly Active Antiretroviral Treatment (HAART) on South African Mines. Among issues which were addressed on the work done was the investigation into the incremental monetary costs and benefits (from the mine's perspective) that might arise as a result of the introduction of highly active antiretroviral therapy to South African mines. The study calculated the net incremental costs over a 10 year time horizon.

These predictions were made in 2001 just before Cabinet made the decision that ARTs should be made available. The paper also indicated the importance of continual use of prophylaxis against opportunistic infections even when the patient is already on HAART. Another aspect which was looked into was concerning the use of non-HAART therapeutic interventions as well as non-drug interventions like education, condom distribution, etc.

A costing study was also conducted at a tertiary hospital in Gauteng province. Thomas *et al* (33) conducted a study with the aim of estimating the total cost of caring for hospitalised patients with HIV & AIDS in the Medical and Paediatric wards of Chris Hani Baragwanath hospital during the period May – June 2005. The data was collected from records of discharges and deaths of in-patients from the Internal Medicine and Paediatric departments over a period of six weeks.

Rationale for the study

The study was conducted based on the fact that HIV&AIDS has become a major cost driver in the health system such that managers and policy makers can revisit their planning programmes so as to meet with the new challenges that will be posed by the effects of the epidemic both in terms of costs incurred and how to prolong life.

Huge amounts of money are being spent on the programme at the expense of other health programmes, therefore it is important to assess how these funds are utilised and whether there is cost-effectiveness which would be among other things through utilisation of treatment protocols. Cost-effectiveness estimates can only be made if the input costs with and without ARVs are known and if the outcomes with and without ARVs are also known.

This study provides the average pre-ARV medicine costs in 2004 prices (in- and out-patients) and the pre-ARV opportunistic infection rates for a group of patients seen in a district hospital over one calendar year.

STUDY AIM AND OBJECTIVES

Aim

To estimate the average direct costs of medication from the provider perspective in 2004 prices for inpatient admissions and outpatient visits for HIV-related conditions in patients at WF Knobel Hospital. WF Knobel hospital is a district hospital in Limpopo Province.

Objectives

(a) To obtain details of all outpatient visits and admissions that were HIV-related during the study period.

(b) To determine the ages and genders of the patients seen.

(c) To record length of stay of inpatients according to diagnosis.

(d) To record details of medicines prescribed.

(e) To ascertain the direct cost to the provider in 2004 prices of the prescribed medicines.

(f) To work out the total cost of medicines prescribed for outpatient visits and calculate the average by dividing by the number of visits.

(g) To work out the total cost of medicines prescribed for inpatient visits and calculate the average by dividing by the number of admissions.

METHODS

Study design

This was a retrospective record review of all patients consulting during 2002. The data was collected using a sheet based on the literature review and a pilot review of records

Study population

This consisted of patients who visited the hospital between the 1 January and 31 December 2002 for HIV-related conditions.

Inclusion criteria

(a) Patients who were diagnosed as HIV positive through ELISA were selected provided the visit was for an HIV-related condition.

(b) Patients of all ages were considered.

(c) Both sexes were considered.

Exclusion criteria

(a) Patients who only came for non HIV-related incidental conditions.

(b) Patients whose visits were for non-therapeutic/diagnostic purposes (for example to complete forms or submit applications etc..)

(c) Asymptomatic people who came purely for the HIV test.

Sampling strategy

There was no sampling because all 108 records found (137 episodes) were followed up. A retrospective record review was conducted. The following data was collected from the records:

1. Details concerning gender and age for each visit/admission.
2. Details of drugs prescribed at each visit/admission.
3. Length of stay of each patient for each admission.
4. Number of visits per patient.
5. Number of admissions per patient
6. Main diagnosis for each visit/admission

The pharmacy section at Polokwane hospital provided the 2004 tender prices for the drugs that were prescribed.

Using this information the average drug costs were determined per admission and per outpatient visit. In addition the highest and lowest cost of prescriptions for outpatient visits and for admissions were noted.

Data was collected per visit of each patient.

The following information was not collected:

1. Residential address.
2. Other direct costs namely laboratory, staff, X-Ray, linen, food, electricity, water, equipment.
3. Indirect costs.

A simple data collection sheet was drawn up (Appendix 2) and used for the data entry. The data was obtained from the patient files and from the pharmacy (prices).

Patients were not staged according to WHO because of the poor quality of clinical records.

Ethical considerations

- To ensure confidentiality, files were kept in the Superintendent's office. Names of patients were not entered on the data collection form, only their hospital registration numbers.
- Informed consent was not required since the patients were not personally involved in the study.

- The study protocol was approved by the Wits University Faculty of Health Sciences Ethics Committee (Appendix 3).

Data analysis

1. Data was extracted directly from the files and hand-written into the data collection form.
2. The data was then entered directly into an MS Excel spreadsheet. The correctness of the entry was checked manually by the researcher.
3. The data was then analysed at the MRC using Stata version 9 (34).
4. The results are presented using frequency tables, means, standard deviations, and other summary statistics.

Classification of medical conditions

Some medical conditions were grouped together to enable data analysis because in some cases there were conditions which presented only once. Conditions grouped together were as follows:

- PTB: lung collapse, reactivation TB, pleural effusion, lung collapse, lung abscess and TB adenitis.
- Pneumonia: PCP, interstitial pneumonias, bronchopneumonia and bronchitis.
- Oesophagitis : oral leukoplakia, oral thrush, oesophagitis and oral herpes.
- Gastroenteritis: chronic diarrhoea and other gastro-intestinal conditions
- Anaemia: anaemic cardiac failure, post-abortal anaemia.
- Malnutrition: here the only medical condition mentioned in the patient records was loss of weight in some cases or malnutrition in others.
- Neurological: Includes meningitis
- Other: this category was covering conditions like arthritis and fever.

RESULTS

Summary of files

During 2002 the NHLS laboratory serving the WF Knobel hospital noted 181 confirmed HIV positive test results. Eight of these results were for routine purposes in healthy individuals (e.g. for insurance applications) and so were excluded from this study. In addition, 33 results were repeat positive results, leaving 140 subjects available for analysis.

Files were found for 108 of these people (77.1%; (see Table I below). This analysis concerns only the first visit or admission: data for second or third visits/admissions has not been included.

Table I: The source of those (108) included in the study

	BALANCE
Total sero-positive test results during 2002	181
Less 8 routine positive results	173
Less 33 repeat positive results	140
Less 32 missing files	108

Quality of patients' records

In 35 (32.4%) of the 108 medical records no formal diagnosis was recorded. Regarding diagnosis for TB, patients were placed on TB treatment without bacteriological proof available in the notes for approximately half the cases. There were 19 TB cases in all. Patients with pTB were also all given *Pneumocystis carinii* pneumonia (PCP) prophylaxis (co-trimoxazole) routinely.

Distribution by gender and age

Table II shows the gender and age profile of the 108 patients whose data about the first visit/admission was used in the analysis.

Table II: Distribution by sex and group

AGE	MALE	(%)	TOTAL
<14	8	61.5%	13
14-20	0	0%	5
21-30	2	6.9%	29
31-40	6	17.1%	35
41-50	7	53.8%	13
>51	8	61.5%	13
TOTAL	31	28.7%	108

The above table indicates that the highest numbers of patients were females aged between 21 and 40 years.

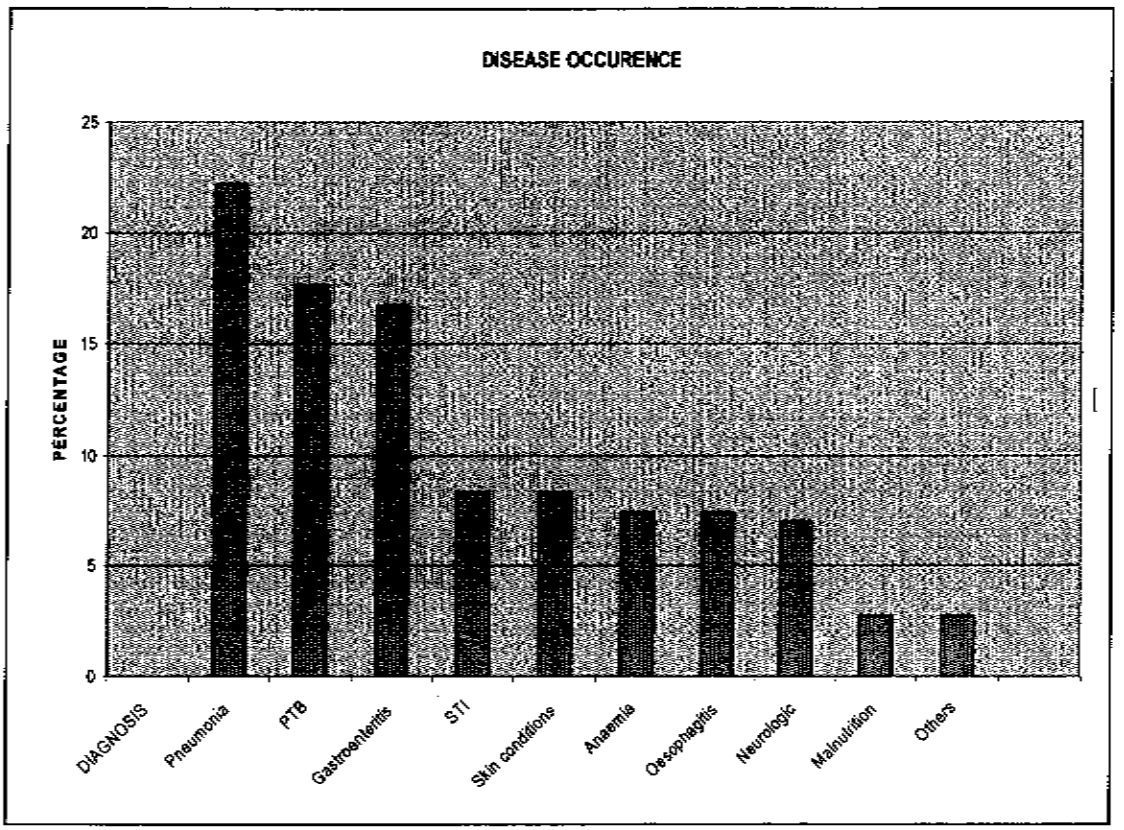
Frequency of medical conditions

On reviewing patients' files, some conditions were noted more often than others. Table III shows all the episodes (in- and out-patient) by diagnostic group as well as their frequencies.

Table III: Number of episodes by diagnostic group

DIAGNOSIS	**Number of times (%)**
Pneumonia	24 (22.2%)
PTB	19 (17.6%)
Oesophageal candidiasis	8 (7.4%)
Gastroenteritis	18 (16.7%)
Neurological	7 (7%)
Sexually Transmitted Infections	9 (8.3%)
Skin conditions	9 (8.3%)
Anaemia	8 (7.4%)
Malnutrition	3 (2.7%)
Others	3 (2.7%)

Figure 2: Distribution of the cases between disease categories



From the figure above, pneumonia was the most common diagnosis followed by PTB. The diagnosis of PTB included cases of pleural effusion since patients with dual HIV /TB infections often present with pleural effusion.

The number of episodes

The total number of outpatient visits for HIV-related conditions during the year was 43

The total number of inpatient admissions during the year was 119.

Length of hospital stay

Total inpatient days was = 1348

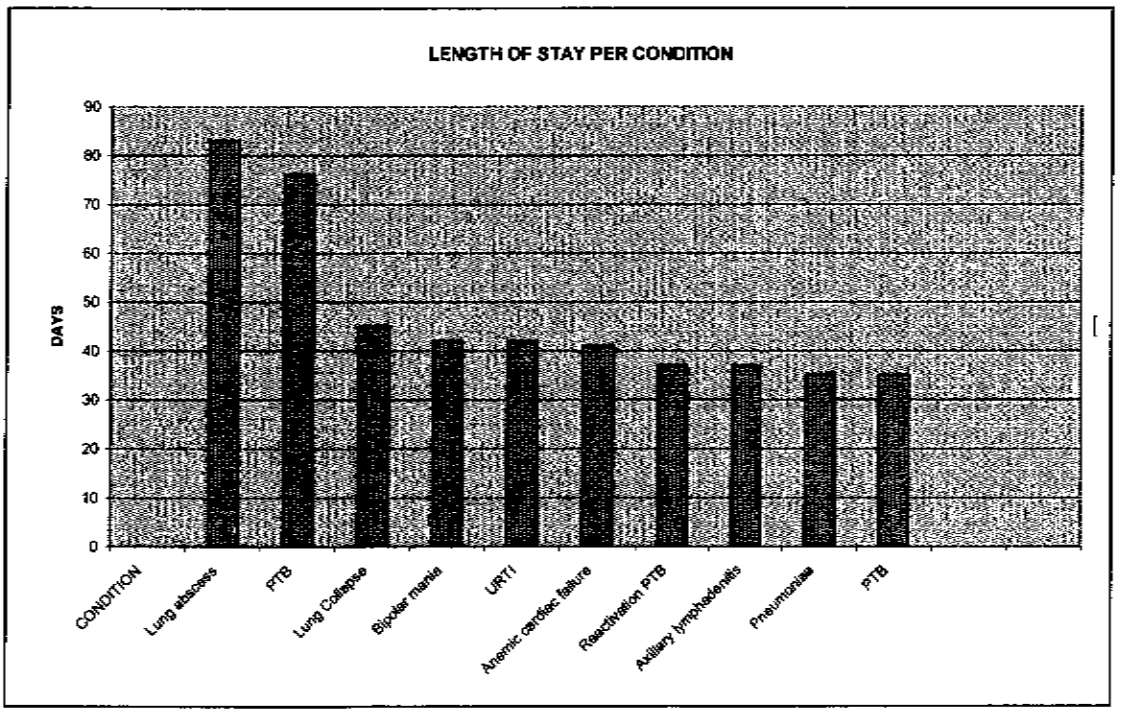
The average length of stay for admissions was 1348/119 = 11.33 days (range 1 to 85). The data was skewed to the right, and the median length of stay was 8 days.

Table IV and Figure 3 show the ten longest lengths of stay by condition.

Table IV: The ten conditions with the longest length of stay

CONDITION	LOS (days)
Lung abscess	83
PTB	76
Lung Collapse	45
Bipolar mania	42
URTI	42
Anaemic cardiac failure	41
Reactivation PTB	37
Axillary lymphadenitis	37
Pneumonia	35
PTB	35

Figure 3: Length of stay by condition for the ten longest admissions



Cost of medication

Total cost of medicines for admissions = R8669.68

Total cost of medicines for outpatient visits = R723.25

The mean cost of medicines per outpatient visit was 723.25/43 = R16.82 (SD = 48.30. The median cost of drugs per outpatient visit was R77.28 (Range: R2.24 - R141.10). The distribution of the costs is positively skewed. The mean cost of medicines per inpatient admission was 8669.68/119 = R72.85 (SD = 80.85). The median was R202.68 (Range 11.01 - to 394.22). Again, the data was positively skewed.

The most expensive outpatient visit cost was for Anti-viral cream for Herpes Zoster (R141.10).

The most expensive inpatient drug costs were for Pulmonary TB (R394.22).

Length of stay versus cost of medication for inpatients

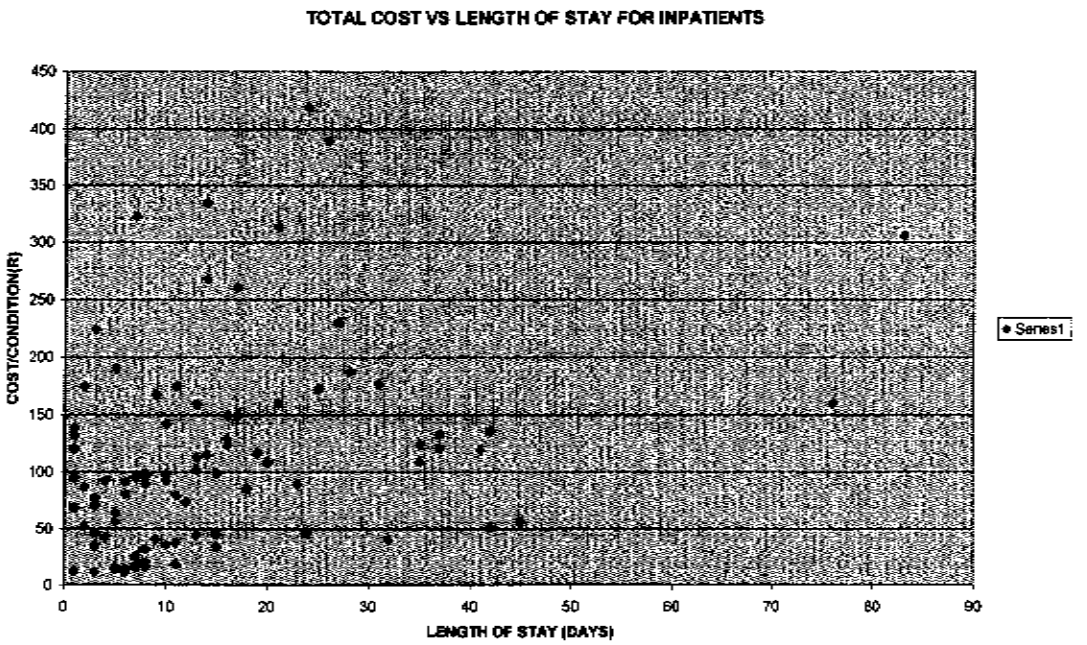
Apart from lung conditions, there was no direct relationship between cost of medication and length of stay, although PTB showed the longest length of stay as well as being the most costly.

Table V and Figure 4 illustrate this information.

Table V: Drug costs and lengths of stay (in-patients) by condition

Condition	Average Cost / condition	Length of stay
Lung conditions	372.32	81.0
Gastroenteritis	84.14	11.5
Oesophageal candidiasis	74.88	10.0
Neurological	66.05	18.8
Others	50.14	12.5
Skin conditions	32.20	13.7
Malnutrition	24.02	10.0
Sexually Transmitted Infections	24.22	4.0
Anaemia	8.65	14.6

Figure 4: Medicine costs vs. length of stay (in-patients)



There was no direct relationship between cost of condition and length of stay.

LIMITATIONS

- Not all the files could be found. Out of 140 records obtained from the laboratory list of ELISA tests conducted in 2002, only 108 files were retrieved. The case details contained in the missing files might have differed substantially from those that were found.
- These findings cannot be generalised to other districts where the case mix and endemic diseases may be different.
- Although larger numbers were expected at the outset of this study the actual numbers of admissions and outpatient visits (especially) were small.
- Average costs of medicines are influenced by the take home prescriptions for inpatients and the take home prescriptions for outpatients. The policy was to give 1 week's supply. If this policy were to change then allowance for this must be made when making comparisons.

DISCUSSION

Study objectives

When this study was initially planned, one of the objectives was to compare total costs for treating HIV positive patients against the total costs for all types of patients. Unfortunately the hospital could not provide this type of information because it was not available. This exercise would have involved calculating individual costs for all patients who visited the hospital in 2002.The hospital uses a system called the Uniform Patient Fee System or UPFS where patients are classified from H1 to H4, H1 referring to unemployed patients or those exempted from payment like pregnant women and children under five, to patients who are identified as private patients because of their salary level. The fee system is such that all patients pay the same amount of money as long as they are in a certain salary bracket and this has nothing to do with the type of treatment they receive. This system is not used in the case of cosmetic treatment like circumcision in which case specific tariffs are used.

Calculation of length of stay was meant to be based on staging of the disease according to the World Health Organisation, however, because the hospital does not perform CD4 counts, this could not be done.

Nutrients

None of the patients who were admitted were placed on any of the food supplements intended to address the nutritional related to the infections.

General

These study results refer only to the drug cost per admission or per outpatient visit. To put this into perspective, Broomberg *et al* have described the total per patient direct costs, also excluding ART, in 2000, as between R15 626 and R20 160.

The study by Mkele *et al*, focussed on drug costs. One of the differences between that particular study and the present study was the fact that only one item was looked at namely an anti-microbials, whereas the present study took into consideration the cost of all different types of medication namely antimicrobials/ antibiotics, supplements and painkillers.

In the Baragwanath study by Karstaedt (15) the commonly occurring conditions were listed as follows: mucocutaneous, gastrointestinal, neurological and sexually transmitted illnesses. Two of them namely gastrointestinal and neurological, were similar to those in the present study.

The other Baragwanath study which was conducted a decade later by Thomas *et al* and here both children and adults were studied. The study was conducted at a tertiary hospital as compared to the hospital under study and as such costs were markedly higher. The first four commonest conditions were similar to the ones used in this study, namely:

i. PTB

ii. Pneumonia

iii. Cryptococcal meningitis

iv. Wasting disease

However gastroenteritis and dermatological conditions were far less common.

CONCLUSIONS

The following conclusions are made:

1. Inpatient prescriptions were much higher in cost that outpatient prescriptions.
2. Among the inpatients those who stayed in hospital the longest were those with tuberculosis.

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ANNEXURE A

CLINICAL DATA COLLECTION

Ref. no	Date of admission	Date of discharge	age	sex	Date diagnosed	Present diagnosis	treatment	Cost

ANNEXURE B

DATA COLLECTION

DEMOGRAPHIC	• Hospital number
PERSONAL DATA	• Date of diagnosis • Date of admission • Date of discharge • Date of death • Date of out-patient visit
CLINICAL DATA Staging will be done according to WHO classification of HIV.	The following diseases will be considered: • Kaposi sarcoma • Oral thrush • Oral hairy leukoplakia • Herpes zoster • Weight loss • Co-infection with Tuberculosis • Intractable diarrhoea