The Costs of Adult Inpatient Care for HIV Disease at GF Jooste Hospital

by Brian Haile

February 15, 2000

Masters Mini-Dissertation for
M.A. Health Economics Degree
University of Cape Town

Supervisor:
Dr. Di MacIntyre
Health Economics Unit
University of Cape Town

ACKNOWLEDGEMENTS

I wish to express gratitude to Yumna Williams, Fiona McGill, and the other abstractors for their data collection efforts; to Norman Maharaj for his continued assistance and suggestions; to Douglas Wilson, Gary Maartens, Peter and Brenda Vurgarellis, Di MacIntyre, Janet Biblin and Deane Conway for their helpful reviews and comments; to Bradley Trope, Nikki Kroon, Elizabeth Fielder, Sue Johnson, Joan Aploon, Traci Dicker for their clinical information and ongoing assistance; to James G. Kahn for his assistance with developing the chart abstraction form; to Peter Morris for the BCH data; and to Robin Wood at the HIV Clinical Research Centre, Somerset Hospital, for his support of this research.

The views expressed and errors herein are my own.

DEDICATIONS

To the folks who cared enough to make sure that I learned.

Especially to Deane and Nelson.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

PUBLICATIONS

The following publications are derived from this and related research:

Haile, B. Critical Messages from an Audit of HIV Inpatient Files (in press).

Haile, B. Affordability of Home-Based Care for HIV/AIDS (in press).*

Haile B, Maartens G, Govender V, Wood R. Economic Evaluation of Cryptococcal Meningitis and Inpatient Tuberculosis Treatment for HIV-Infected Individuals in South Africa (in preparation).

* *publication in a peer-review journal.*

ABSTRACT

Background

The lack of patient care and utilisation data impairs the ability of hospital and clinic administrators to make informed, data-driven policy choices. This concern is particularly acute with HIV/AIDS, given both the striking growth in the local epidemic over the last two years and the high level of HIV-related health expenditures shouldered by the provincial medical system in the Western Cape province of South Africa.

Methods

A retrospective chart review was conducted to capture clinical and utilisation data of from a sample of 59 inpatients, who were admitted to a township secondary hospital near Cape Town, South Africa during 1997. Three years of data were abstracted and analysed.

Results

This sample was exclusively comprised of Black and so-called Coloured inpatients. Patients in the sample had a mean age of 35 and roughly 63% were female. Mean length of stay was 5.2 and 4.0 days for WHO stage 3 and 4, respectively, though the estimated variance was large.

The clinical picture proved interesting. Tuberculosis was present in roughly 66% and 38% of stage 3 and 4 patients, respectively. The frequency of gastrointestinal complaints was also high, as was the occurrence of suspected meningitic illnesses and other neurological complications. Co-trimoxazole use was strikingly low, particularly given the documented survival benefit and low cost of the drug. Patients who initially present in stage 4 HIV disease lived a median of 20 days; this estimate has a relatively narrow confidence interval.

Cost of care estimates were generated from these and other data. The general cost per inpatient day at this facility was R504. The patient-specific utilisation was approximately R151 for patients in stage 3 and R113 for patients initially presenting in stage 4. Lab tests constituted the largest share of patient-specific utilisation, followed by medications and radiology. The general costs comprised about 80% of total costs.

Conclusions & Recommendations

The confirmed HIV-infected patients at this facility represent about 2% of total inpatient volume during the study period. Many HIV-diagnoses were new, and a substantial portion of HIV-tests were motivated by clinical or presumptive diagnoses. Differences in survival between this sample and that reported elsewhere in South Africa may be related to access to specialty outpatient care.

Based on this study, I offer the following operational recommendations for local medical superintendents and other health policy decision-makers:

1. Increase the use of co-trimoxazole prophylaxis in stages 3 and 4 of HIV disease.
2. Review treatment protocol for patients initially presenting at WHO stage 4.
3. Focus on pain management/palliative care education among clinicians.
4. Better utilise home-based care alternatives for terminal/moribund patients.
5. Reduce specific laboratory/antibiotic utilisation.
6. Increase bed availability at non-acute, chronic care facilities
7. Bridge the current gaps in information technology.
8. Introduce unique patient identifiers (UPIs).
9. Improve documentation in patient charts.

The demand for HIV-related health care services will increase as the epidemic grows in this province. These recommendations may improve the capacity of the health system to address these needs and improve patient health outcomes.

I. INTRODUCTION

The lack of patient care and utilisation data impairs the ability of hospital and clinic administrators to make informed, data-driven policy choices. This concern is particularly acute with HIV/AIDS, given both the striking growth in the local epidemic over the last two years and the high level of HIV-related health expenditures shouldered by the provincial medical system.

Frustrated by the scarcity of local data, I attempted to characterise an HIV-inpatient population and related expenditures within a secondary acute hospital that serves a township area of Cape Town. Though the sample was small (n=59), I was able to review three years of clinical and utilisation data.

The results reported here serve as the basis for several policy recommendations and suggestions for further research. I hope these findings and recommendations prove helpful to local health policy-makers. Further, I hope that this document is informative for current and future researchers working in this critical area of health policy.

II. OBJECTIVES

Given the need among health planners for cost data relating to HIV inpatient care, I endeavoured to:

(1) describe patterns of presenting illnesses;

(2) estimate duration of survival from time of presentation;

(3) quantify costs of inpatient care; and

(4) identify areas of cost-containment in care provision

for HIV-positive patients who seek care and are admitted to township-area secondary hospitals.

These patients would reflect the characteristics of those who are admitted to secondary hospital facilities in township areas in the Western Cape. They would presumably be in symptomatic or late-stage HIV disease (WHO stages 3 or 4) in order to be admitted.* Further, they would be experiencing an acute illness episode, making them more ill than others even within their respective disease stage. Also, because of the prohibitively high cost of HIV therapies, these patients would also be antiretroviral-drug naive. As a consequence of these factors, their costs of care may be quite different than for other HIV-infected individuals.

* HIV-infected individuals are classified according to WHO-recognised clinical staging criteria. Stages 1 and 2 are relatively early stages of HIV-disease, while stage 3 indicates symptomatic disease and stage 4 denotes an AIDS-defining condition.

III. LITERATURE REVIEW

Background

A. Clinical literature

The local HIV/AIDS epidemic is well characterised. Research by van Harmelen et al (1996) suggest that the "epidemic" is actually two distinct patterns, one subtype-B epidemic among men who have sex with men and a separate subtype-C epidemic among black heterosexuals.[1,2] This evidence suggests that, unlike in the industrialised world, no bisexual or injection drug-use "bridge" existed in South Africa.

The natural history of the local epidemic has also been analysed extensively. HIV-infection is no more virulent here than in industrialized countries. For instance, HIV-infected individuals here with access to medical care exhibit a median survival comparable to that seen in the industrialised world prior to the advent of antiretroviral therapies in the early to mid-1990's.[3,4] However, differences clearly exist; in particular, the HIV epidemic in the Western Cape occurs within and alongside a pre-existing local epidemic of tuberculosis.[5-9] Further, the type and frequency of AIDS-related opportunistic infections differs slightly from that seen elsewhere.[10]

B. Economic literature

Several critical studies on the economic implications of HIV/AIDS in South Africa are contained in the volume edited by Broomberg et al.[11] These analyses look at the macroeconomic impact of HIV, and broadly concluded that the epidemic will have only a peripheral effect on GDP performance. They also summarise the mechanics of the popular Doyle model, which uses an actuarial approach to project the growth of the epidemic in different areas of the country. This work was the principal existing source of scholarly information regarding HIV and the South African economy at the time of this review.

C. Health services research

There is a paucity of health economic research related to specific conditions or treatment modalities (including those for HIV) within the South Africa health system. Several authors report the net benefits (costs) of an intervention[12-14] or the conditions under which the intervention in question would prove feasible.[15,16] Other studies report the costs of a particular intervention or

medical condition[17-23] or compare the gross or net benefits (costs) of two or more intervention strategies.[24-27] None of these studies, however, allows us to assess whether the interventions were "efficient" health investments in terms of the cost per life year gained, cost per disability-adjusted life year (DALY), or cost per quality-adjusted life year (QALY).

A few local studies do quantify and report a cost per life year (or DALY or QALY). Marik et al (1993) report that the cost per life year gained for intensive care at Baragwanath in 1990 approximated R625, though their calculation is difficult to validate.[28] Malan et al (1992) provide a more verifiable estimate of R344 per QALY for neonatal care at Groote Schuur in 1990.[29] Perhaps the most the most sophisticated analysis is by Söderlund et al (1998); they use a mathematical model to estimate a R124 cost per life year gained for formula feeding interventions for HIV-positive mothers and a net savings for two alternative antiretroviral regimens for the prevention of HIV-vertical transmission.[30] Wilkinson et al (1999) also use a mathematical model to analyse the cost-effectiveness of mother-to-child transmission interventions; they calculate a cost per DALY of R27, which becomes cost saving under more optimistic assumptions of care costs.[31] Only one of these analyses above considered an intervention for adult patients, and its veracity cannot be established from the data reported.

Unlike the literature from Europe, North America, and Australia, no South African researchers have evaluated interventions and reported their findings for chronic diseases such as diabetes mellitus, hypertension, renal failure, etc. These types of analyses are perhaps most appropriate for comparing the cost-effectiveness of clinical interventions in adult populations.

In terms of HIV-specific analyses, the number of studies is exceedingly small. The HIV cost-effectiveness literature consists of to the two studies of interventions for preventing mother-to-child transmission (noted above). Further, the cost-of-care literature is limited to four studies.[17-20] Of these studies, the most important are those by Kinghorn et al (1996) and Karstaedt et al (1996), both of whom analysed data from Baragwanath Hospital, a tertiary care facility, in Johannesburg. These studies will be detailed further below and in the Discussion section.

Formal literature survey

A. Methods

I formally reviewed formal HIV patient cost and utilisation studies from South Africa and the United States conducted and/or published during1989-1997. In this summary, I noted the

methods employed and the choice of outcomes in each study. These findings were used to develop the protocol for my research at GF Jooste.

My inclusion criteria for the formal literature review were straightforward. First, studies must have reported either a:

- cost-of-care outcome (e.g., cost per patient day, cost per patient month) or
- utilisation measure of interest (e.g., inpatient admissions or number of ambulatory visits per year).

Second, the sample populations had to be HIV-positive. Both published and unpublished data were included for review. Given my familiarity with the U.S. health care system, I narrowed the literature search to only those studies conducted in the U.S. or South Africa. On these bases, twelve studies from the U.S. and four from South Africa were reviewed (see summary table included as Appendix A).[17-20,32-41] (review includes unpublished data from Medi-Cal program (1996) and Moore (1996))

B. U.S. Results

Virtually all of the U.S. studies were retrospective analyses of patient charts, hospital files, and institutional databases. Most studies reported a cost per patient month (or per patient year). This achievement is presumably linked to the availability of high-quality follow-up data. One study had a particularly clever approach to circumvent this problem: Hellinger (1994) totalled costs in the last three months of life.

The definitions of "HIV disease" and "AIDS" differed across the U.S. studies. Early studies relied on the 1987 U.S. Centers for Disease Control (CDC) definition of AIDS and AIDS-Related Complex (ARC). However, due to subsequent research advances in clinical immunology and retrovirology, the CDC formally changed its definition of AIDS in 1992 from a set of clinically based criteria to one defined by laboratory surrogate markers (i.e., CD4 counts). Several authors attempted to mould their findings to the new lab-based categories, though the continued use of clinical descriptors (e.g. "asymptomatic" or "AIDS by 1987 definition") were common. These different categorisations make comparisons across studies more difficult.

The U.S. researchers generally used one of two approaches to estimate costs. In the first method, researchers used an entire patient database to estimate a vector of costs for individual services; this vector was then multiplied by an utilisation estimate generated from a survey of HIV-positive individuals. Examples of this approach include Andrulius et al (1992), Hellinger

(1992), and Hellinger et al (1994). The second method involved simply used billing information on individual patients to estimate total costs. Examples of this "accounting" approach include Reitmeijer (1993), Moore and Chaisson (1996), Moss et al (1992).

C. South Africa results

In South Africa, the clinical literature presents both clinical and lab-based immunological characteristics of the local population. However, the categorization in the formal cost literature is limited to WHO clinical staging. This method is perhaps more appropriate given the resource constraints, which preclude the widespread and consistent use of expensive immunological tests.

The costing approach differed slightly as well. Both the Kinghorn et al (1996) and Karstaedt et al (1996) used vectors of cost estimates derived from other sources (e.g., SAIMR tariffs for laboratory costs), but they also conducted a costing exercise to determine the unit cost of radiological services, etc. This approach is required (1) if cost-center accounting is not regularly used and (2) if plausible cost estimates for specific services are not available. These two conditions hold true for the state health care system, both at the time of Kinghorn's and Karstaedt's research and now.

IV. METHODS

Patient Sample

All sample data was collected from GF Jooste (GFJ) Hospital. The GFJ staff routinely collects statistics about patients living with HIV/AIDS. The Infection Control Sister there records the name, folder number, and relevant demographic data for all HIV-positive patients admitted to one of the inpatient wards. Such patients may be known to be HIV-positive prior to their admission or have a positive HIV-result while in hospital. Collectively, these patients constitute the population from which I constructed my sample.

I chose 1997 as the sample year as this gave sufficient time for data follow-up. Also, the hospital only opened in mid-1996; consequently, I felt that some delay was necessary in order to allow hospital data and clinical systems to be fully functional prior to the sample period.

During 1997, the Infection Control Sister recorded 294 entries for HIV-positive inpatients. In order to eliminate duplicate entries, I sorted the data by surname, first name, and folder number. I found 23 cases where patients had been recorded more than once.

From the 271 unduplicated inpatients recorded as HIV-positive in the Infection Control Log, I randomly selected 72 patient charts in order to retrospectively abstract inpatient utilisation.[†] Of these, five patients lacked HIV-test results and their chart notes made no mention of known HIV-status. Two additional patients were seen in the Casualty Department but were not admitted to an inpatient ward. One other patient had cryptococcal meningitis but had a negative HIV-antibody test result. Thus, our research team abstracted the inpatient utilisation for the remaining 64 patients for the period from August 1996[‡] to August 1999.[§]

While abstracting the patient records for these 64 inpatients, we found one patient at stage 1 and three patients at stage 2. In addition, we found one patient at stage 3 who was a participant in an antiretroviral clinical trial. Though we abstracted data on these five patients, they were excluded from the analysis. Therefore, the final patient sample detailed below includes some 59 HIV-positive inpatients in stages 3 or 4 of disease.

[†] To randomly select patients, I used the Excel Random Number Generator to generate a number between 0 and 1 for each patient. Using these numbers as the reference, I then sorted the patients in ascending order and chose the first 72. The size of the sample reflected the number of patients for which we could abstract sufficient data given our time constraints and limited resources.

[‡] Only one of the patients in this sample was hospitalised during 1996 (the patient was admitted in November); therefore, the "start-up" effects during mid-1996 likely generated very little bias in the data.

[§] One patient was only diagnosed as HIV-positive at their second admission. Given that the first hospitalisation was less than a week earlier, I included the first hospitalisation as part of the study.

Antiretroviral use

Researchers in North America and Europe have demonstrated that anti-retroviral use (the so-called dual- and triple-"cocktail" therapies) can reduce morbidity and mortality.[42-44] Subsequently, researchers showed that these drugs dramatically alter utilisation patterns and costs of care for HIV disease.[36,45-48] For these reasons, it is important to ensure that the sample data does not combine patients who were accessing anti-retroviral therapies with those who were not.

The patients included in this sample are highly likely to be anti-retroviral naive. The Sister in Charge at the Clinical Research Centre of Somerset Hospital reviewed the list of patients in the sample to determine whether any were participants in the Centre's clinical trials. Only one patient was a participant in a clinical trial[**] and, as noted in the "Patient Sample" section above, data was abstracted for this patient but later excluded from the analysis. It is possible that some patients in our sample accessed antiretroviral therapy through private providers or other clinical trials, though the geography and economic status of the patient population makes this a remote possibility.

Data Collection

A research team of four abstractors used a customised chart abstraction form to capture the GFJ inpatient utilisation data.[††] I developed this chart abstraction instrument in consultation with Dr. James G. Kahn, Associate Professor at the University of California, San Francisco; Dr. Norman Maharaj, Superintendent of GF Jooste; and Dr. Yumna Williams, Medical Officer in Ward 2 of GF Jooste. This instrument enabled abstractors to collect data on patient demographics, patient admission data, laboratory tests, diagnostic and treatment procedures, radiology, and medications. Dr. Williams and I piloted the instrument at GF Jooste in May to July, 1998 by abstracting the data from five patient folders and revising the instrument as appropriate. The final version of the instrument used for all data collection is included as Appendix B.

Data collection took place between July 1998 and September 1999. In the last month of data collection, we reviewed all files of patients surviving after January 1, 1998 to ensure that we captured any documented utilisation in the time since we began abstracting data.

[**] The patient's clinical trial participation was also noted in the GFJ folder.
[††] The abstractors, Dr Y Williams, F McGill, G Meijer, and N Schrueder, were all final-year medical students or Medical Officers. Dr. Williams and Ms. McGill captured data for 70% and 21% of the patients, respectively.

After entering all data into an Excel spreadsheet, I reviewed each chart abstraction and noted any irregularities, unusual or large quantity utilisation, and other abnormalities or outlying results. Dr. Williams answered any questions about the chart abstractions if the original files did not provide sufficient information. We consulted with specialist physicians in HIV medicine at Somerset Hospital and other hospitals with any unresolved questions.

Hospitalisations and Length of Stay

Descriptive statistics about patient admission were principally gathered from the patient's chart. As often as possible, I coded the inpatient admission and discharge dates as they are recorded in the patient's file. These dates occasionally differed with the computerised GFJ admissions records by one or (rarely) two days, which may be the result of late-night admissions or delay in processing files within the Casualty/Records Department. When the date of admission or discharge was unclear in the patient notes, I relied on the computerised records.

To check the number of admissions, I compared the data from the inpatient notes with the computerised admission records. In several cases, a patient was discharged and shortly thereafter readmitted, but the patient notes recorded only a single hospitalisation. In such cases, I relied on the computerised records to assess the total number of hospitalisations if no further information was available. Also, the computerised admission records in several instances suggest that patients were admitted only as Casualty patients. Where inpatient discharge summaries, etc. existed in the patient file, I assumed that the patient had been admitted to the ward as an inpatient.

I calculated length of stay (LOS) by subtracting the date of discharge from the date of admission. For example, a patient admitted on 04-Jan-98 and discharged on 07-Jan-98 had a LOS of three days. In cases of same-day admission and discharge, I set the LOS equal to one.

Diagnoses and WHO Staging

All patients in this study either tested positive for HIV-antibodies at GFJ or were known by the clinical staff to be HIV-positive. The frequency of HIV-tests and confirmatory assays was recorded for each patient in the sample. If a patient had a single HIV-test result, I assumed the test used was a Rapid Screen assay; this assumption is consistent with the HIV-testing protocol at GFJ during the study period.

Using the World Health Organisation's (WHO's) Clinical Staging Criteria,[48] the abstractors determined the clinical stage of the patients for each hospitalisation. Additionally, the abstractors reported the discharge diagnoses for each patient based on the lab results, chart notes,

and discharge summaries in the folder. If the reviewer or abstractors queried the clinical staging or diagnoses, we consulted with local HIV-specialist physicians to confirm the abstractors' initial conclusions.

The coding of tuberculosis in this study reflects the uncertainty surrounding tuberculosis diagnoses at GFJ. I coded cases as "TB confirmed" if the patient had least one AFB- or culture-positive result. I coded cases as "TB (given Tx)" for patients who were given treatment but who lacked a documented laboratory diagnoses. Finally, I coded cases as "TB suspected" if the chart notes mentioned suspicion of tuberculosis or if the patient was referred to a local TB clinic. None of these latter cases were prescribed anti-TB medications prior to the discharge from GFJ.

For purposes of this study, I considered a single laboratory-positive result as a confirmed TB diagnosis. However, this practice differs from WHO guidelines, which require confirmation of TB from a second AFB- or culture-positive result. For costing exercises in a TB-endemic area, however, the use of a single result probably introduces little bias (personal communication, Dr Robin Wood, 3/9/99). Further, in this setting, GFJ clinicians may base their treatment decisions on a single AFB- or culture- positive result. For these reasons, a single laboratory-positive result seemed sufficient for a non-clinical analysis.

Survival and Follow-Up Data

Dates of death and other follow-up data were collected from the GFJ patient folders, the City of Cape Town Department of Health, the City of Tygerburg Department of Health, the Red Cross Society's HIV/AIDS Home-Based Care Program, St. Luke's Hospice, and the Missionaries of Charity (Sisters of Mercy) Hospice. In some cases, the first names of patients were recorded or spelled differently in the patient/client databases than in the GFJ folder. If the age, sex, township were the same and if the patient's date of death was after date of last GFJ discharge, I assumed that the patient's identity was the same.[‡‡]

The data were used to construct Kaplan-Meier "survival" tables and confidence intervals[§§] for patients in stages 3 and 4. To evaluate the sensitivity of my estimates to differences in staging practices, I used four different coding methods and compared the results. If these methods generate consistent estimates, then I can be more confident that minor variations in clinical

[‡‡] Interestingly, the medical examiner/district surgeon listed AIDS, tuberculosis, or "acute pulmonary heart disease" as the cause of death for most patients in question.

[§§] Standard Kaplan-Meier tables were constructed, and 95% confidence intervals were estimated using the method reported by Hosmer and Lemishow (1999).

staging among doctors have little impact on the survival estimate for each disease stage. I used the following coding rules:

Method A: Assumes that staging is correct; includes censored observations

Method B: Assumes that staging is correct; excludes patients lost to follow-up and censored

Method C: Assumes that stage 3 patients who die within two weeks of discharge were actually stage 4 at their last hospitalisation; includes censored observations

Method D: Assesses time to death of patients initially presenting at stage 3 (rather than time to progression to stage 4 or death)

A comparison of the results should therefore indicate the effect of minor variations in retrospective coding on median time to progression or death for patients in each stage.

Inpatient Costs

In my approach to costing, I implicitly assumed that HIV-infected inpatients have the same intensity of nursing and clinician utilisation as other ward inpatients at GFJ. Unfortunately, it is not possible to validate this assumption in practice. Given the volume of patients, nurses and treating clinicians would not be able (nor willing) to maintain an accurate log recording time spent with each patient. Further, it may not be possible to correlate the patient names and clinician time in such a log with HIV-test results.

Consequently, I calculated two types of costs in order to estimate a cost per inpatient day for HIV-positive inpatients. First, I calculated the general recurrent cost per inpatient day at GFJ for 1997. These costs exclude those for which patient-specific data exists (e.g., laboratory tests, radiology, diagnostic and treatment procedures, and medications). Second, I calculated a cost per inpatient day for utilisation that is patient-specific.

A. General Recurrent Cost per Inpatient Day

To calculate general patient costs, I modified the standard formula used to compute estimated daily average costs (EDAC). The standard formula presently used in the Provincial Administration is:

$$\text{EDAC} = \frac{\text{net}}{\text{out}/3 + \text{in}}$$

net = net expenditure
out = number of outpatient and casualty visits
in = number of inpatient days

I made two changes to the formula and inputs:

(1) To exclude patient-specific and capital costs, I subtracted all costs for medications, specific medical equipment for procedures, laboratory tests, and capital expenditures from "net." These costs were reported in a statement of 1996/97 GFJ expenditures.[***]

(2) To more accurately reflect costs of outpatient and casualty visits, I increased the coefficient of "out" to 0.43 from 0.33. This is consistent with estimates reported in recent research.[49]

With this modified formula, I estimated the general costs per inpatient day.

B. Patient-Specific Costs

To calculate patient-specific expenditures, I multiplied the utilisation data captured in the retrospective chart review by an array of unit costs. This array was generated from the following data sources:

(a) Laboratory costs were from the South African Institute of Medical Research's (SAIMR) 1996/97 tariff;[†††]

(b) Costs for radiology and diagnostic and treatment procedures reflect the 1996 Scale of Benefits (Sc/B) rates reported by the Medical Association of South Africa;[‡‡‡]

(c) The costs of stores and fluids[§§§] were 1998/99 provincial tender prices, which were appropriately adjusted for inflation; and

(d) The costs of medications were 1996/97 provincial depot catalog price; for drugs not "on code," the 1996/97 provincial tender price was used.

When stores were required for drug delivery (e.g., syringes, nebuliser masks, etc.), they are included in the cost of the medication. In the case of IV drips, however, multiple drugs and fluids can be dispensed with a single pump, tube, and needle; the IV drip is therefore considered separately from any specific medication.

In several instances, the drug dose and/or method of delivery recorded in the abstractions was implausible. A physician reviewed all reported drugs and dosages; in clear cases of error, the reviewer suggested the dose most likely to have been prescribed and dispensed. In other cases, the patient chart was reviewed for additional information. Specific notes in this regard are found in the Unit Cost Table in Appendix C.

[***] M. Blecher at the Department of Health provided this "level-four" disaggregated accounting statement.
[†††] SAIMR 1996/97 tariff schedule reported rates for September 1996 to September 1997.
[‡‡‡] Sc/B rates for 1996 were used as per suggestion by D MacIntyre as these likely represented costs for diagnostic and treatment procedures within the public sector in 1997.

Physician Review

Once the data coding, analyses, and summary were complete, I conducted two structured interviews with HIV-specialist physicians. They reviewed each of the data tables presented below, particularly the discharge diagnoses and the expenditure analysis. With the expenditure analysis, they provided suggestions as to how resources may be better targeted. Further, they suggested areas in which spending can be reduced with minimal effect on the clinical management of patients.

[§§§] Stores and fluids include needles, syringes, bandages, IV's, rehydration fluid bags, blood, etc.

V. RESULTS

Descriptive Statistics

The original patient sample (n=72) decreased as we eliminated those persons who did not have any details of HIV-status, who were not in stage 3 or 4 disease, or who were on an antiretroviral clinical trial. The resulting sample (n=59) was subdivided into three exclusive categories of hospitalisations:

(a) those occurring in stage 3;

(b) those occurring in stage 4 among patients who initially presented at stage 4;

(c) those occurring in stage 4 among patients who initially presented at stage 3.

Note that *patients* in (a) and (b) are mutually exclusive, while (a) and (c) necessarily overlap.

Table 1: Descriptive Statistics of Patient Sample (n=59)

	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
Sample size	35	24	9
% Female	62.9%	62.5%	66.7%
Mean age	34	33	36
Total hospitalisations	48	29	26
Total Inpatient Days	251.0	116.0	110.0
Mean LOS	5.2	4.0	4.2
95% CIs	(0.0, 14.0)	(0.0, 8.8)	(0.0, 9.6)

The descriptive statistics from this sample are presented in Table 1. The 35 patients who initially presented in stage 3 had 48 hospitalisations before progressing to stage 4, death, or being lost to follow-up. Nine patients who initially presented in stage 3 were subsequently hospitalised as stage 4. For hospitalisations in stage 3, the mean length of stay (LOS) of 5.2 days is slightly higher, though not statistically different, than for hospitalisations in other categories. The mean patient age and the proportion of female patients were consistent across categories.

Extrapolating from the sample, the total of 271-recorded HIV-positive inpatients likely had about 400 admissions with some 1,800 inpatient days during stages 3 and 4 (data not shown). These estimates represent 1.5% of total admissions and 2.0% of inpatient days at GFJ for FY 1997/98 and 1998/99 combined.

New HIV and TB Diagnoses

Because HIV and TB are overlapping epidemics in the Western Cape, I jointly report the new HIV and TB diagnoses among these patients. The inter-relationship between these local epidemics is explored elsewhere,[50] though it is important to note that TB prevalence among HIV-infected individuals (particularly Black African patients) is quite high.

Most of the patients in this sample (79.6%) received an HIV diagnosis while at GFJ. The majority of diagnoses were made with a single Rapid Screen assay, though most of these were sent to the UCT Virology Laboratory for two confirmatory ELISA tests.**** In a few instances, more than one Rapid Screen test was documented in the patient file; a single ELISA confirmatory test was often done following the second Rapid Screen test.

Table 2: New HIV Diagnoses (number of patients)

Diagnosis	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
One positive Rapid Screen[1]	23	16	0
Two or more positive tests[2]	5	2	0
Outside of GF Jooste	7	6	0

[1] The first Rapid Screen was often automatically followed by two ELISA tests.

[2] The second test was most often a Rapid Screen, followed a single confimatory ELISA test.

A high proportion of these patients received a tuberculosis diagnosis while in hospital. Well over half (65.7%) of stage 3 patients either had at least one AFB- or culture-positive result and/or were given anti-TB medications. The latter were presumably given medication because of a previous diagnosis outside of GF Jooste or their TB diagnosis was not properly documented in the patient file. Tuberculosis prevalence fell in later disease stages, though there may have been undiagnosed cases among moribund/terminal patients.

Table 3: TB Diagnoses and Prevalence (number of patients)

Diagnosis	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
One AFB+ or culture+ result[1]	13	2	0
No documented result, given Tx[2]	10	7	3
Percent of total patients	65.7%	37.5%	33.3%

[1] One patient again tested positive for TB six months after initial test.

[2] Especially with cases diagnosed outside GFJ; independent of confirmed cases.

**** The GFJ administration halted this practice in 1997-98; the GFJ laboratory now recommends that the doctor send a second specimen to UCT for a confirmatory ELISA test if a patient is Rapid Screen-positive.

Two particular issues are noteworthy. First, these data confirm the high prevalence of TB among HIV-infected inpatients. Second, these data suggest that primary health care providers may not have detected and/or treated a high proportion of these cases prior to the inpatient admission. Given the public health implications regarding tuberculosis co-infection, these findings are cause for concern.

Use of Co-trimoxazole

Recent reports suggest that co-trimoxazole use in stage 3 patients confers a significant survival benefit.[51,52] As a result, the forthcoming HIV Clinical Guidelines recommends co-trimoxazole prophylaxis for all patients in stages 3 and 4. Given the efficacy of this relatively inexpensive drug, we recorded its utilisation (including both treatment and prophylactic doses) among the patients in the sample.

The use of co-trimoxazole was surprisingly low. Only about one-fifth of stage 3 admissions included any dose. Roughly the same proportion in stage 4 were prescribed co-trimoxazole, though the high in-hospital mortality among patients initially presenting at stage 4 may explain the low use. The number of patients for analysis, however, remains quite small.

Table 4: Co-trimoxazole use, stratified by TB status (total hospitalisations)

Diagnosis	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
TB admissions w/ co-trimoxazole Tx[1]	5	2	2
TB admissions[2]	24	10	3
Percent of hospitalisations	20.8%	20.0%	66.7%
Non-TB admissions w/ co-trimoxazole Tx	6	3	15
Non-TB admissions[3]	24	19	23
Percent of hospitalisations	25.0%	15.8%	65.2%

[1] Co-trimoxazole, any dose.

[2] Admissions in which TB was either a primary or secondary diagnosis; excludes suspected TB cases.

[3] Includes suspected TB cases.

Two other interesting results warrant mention. First, co-trimoxazole use was largely independent of confirmed TB status. Second, co-trimoxazole use was much higher in admissions among those who initially presented at stage 3 and who had progressed to stage 4 (i.e., those who were already receiving care). Even so, co-trimoxazole appears to be under-utilised, particularly given its effectiveness and affordability.

Patient Diagnoses at Discharge

Discharge diagnoses for these patients are reported in Table 5. Given the high rate of stage 4 patient mortality in hospital, these figures may underestimate the actual frequencies as there may have been undiagnosed cases among moribund/terminal patients.

Table 5: Discharge Diagnoses (total cases, % of total hospitalisations)

Diagnoses	Initially WHO Stage 3		Initially WHO Stage 4		Transfer to Stage 4 from 3	
HIV-Related, non-OI						
Candida, oral/vaginal (given Tx)[1]	7	14.6%	8	27.6%	7	26.9%
Candida, oral/vaginal (noted)	4	8.3%	2	6.9%	3	11.5%
Gastrointestinal complaints[2]	10	20.8%	7	24.1%	17	65.4%
PTB (confirmed or given Tx)	24	50.0%	9	31.0%	3	11.5%
PTB suspected	5	10.4%	5	17.2%	1	3.8%
Respiratory complaints	8	16.7%	2	6.9%	5	19.2%
Opportunistic Infections						
Candida, oesophageal		n/a	1	3.4%	0	0.0%
Disseminated TB (given Tx)		n/a	1	3.4%	0	0.0%
Disseminated TB suspected		n/a	2	6.9%	0	0.0%
Kaposi's sarcoma		n/a	1	3.4%	0	0.0%
Meningitic illness suspected		n/a	7	24.1%	0	0.0%
Other neurological conditions		n/a	4	13.8%	1	3.8%
Wasting		n/a	1	3.4%	0	0.0%
Non-HIV Related						
Cardiac: CFO/CMO	0	0.0%	0	0.0%	4	15.4%
Diabetes	1	2.1%	0	0.0%	4	15.4%
PID (grade I, II)	1	2.1%	2	6.9%	0	0.0%
Renal impairment/failure	0	0.0%	2	6.9%	2	7.7%
Other diagnoses[2]	8	16.7%	5	17.2%	6	23.1%
Teminal: no investigations	0	0.0%	2	6.9%	1	3.8%

[1] Diagnosis not documented in doctors notes, etc., though use of topical anti-fungals consistent with candida.
[2] No organism isolated.
[3] Treatment modalities for these conditions vary more widely than for respiratory and gastrointestinal complaints.
[4] Please refer to Appendix D for a detailed break-down of "Other diagnoses."

Note: columns do not sum because some patients have multiple diagnoses.

Tuberculosis was common in all categories of patient hospitalisations. Pulmonary tuberculosis was confirmed and/or treated in 50.0% of stage 3 hospitalisations, and tuberculosis (pulmonary and disseminated) was reported in 31.0% of all hospitalisations among those who initially presented in stage 4. Other respiratory complaints (particularly pneumonias) were also widespread, especially in stage 3 hospitalisations.

The frequency of gastrointestinal complaints were also quite high. Over one-fifth of stage 3 hospitalisations involved gastrointestinal problems (diarrhoea, vomiting, dysentery, etc.); the frequency increased dramatically in later-stage admissions. Few of the patient notes mention the isolation of any organism (e.g., cryptosporidiosis, etc.), though this aspect was not investigated thoroughly in this study.

The occurrence of suspected meningitic illnesses and other neurological conditions was high as well. These conditions were often the presenting illnesses for many patients in stage 4 disease. In contrast, oesophageal candida, Kaposi's sarcoma, and wasting were quite rare.

Oral and/or vaginal candida (or "thrush") were documented in less than 10% of all hospitalisations. This finding is surprising given the anecdotal reports of higher prevalence in similar facilities. However, the frequency of candida in this sample was likely much higher than was reported in the patient files. Judging from the prescriptions for nystatin, clotrimazole, and amphotericin B medications (all of which are used to treat candidiasis), it appears that oral and/or vaginal candida were likely present in a total of 22.9% of stage 3 hospitalisations and more than 35% in stage 4 admissions. While reasons for such under-reporting remain unclear, candida may have been secondary diagnoses for these patients and as such were simply not documented in the chart notes and discharge summaries.

Patient Survival

The Kaplan-Meier survival analyses generated some of the more interesting results in this study. Patients who initially presented in stage 4 survived a median of only 20 days. The narrow confidence intervals suggest a reasonable degree of certainty about this estimate. Indeed, regardless of the method used to estimate their survival, the patients who initially present at stage 4 lived for only a brief period of about two to three weeks.

There is less certainty, however, about the survival of patients who present in stage 3. They spent a median of 273 days in stage 3 before progressing to stage 4 or death. Of the nine patients that progress to stage 4, they survive a median of 59 days in that stage. Overall, patients initially presenting in stage 3 survive for a median of 401 days. However, each of these estimates has quite large confidence intervals, indicating the high level of uncertainty around the median estimate. For these reasons, one has much less confidence in the point estimates for median survival of patients who initially present in stage 3 and for those who transfer to stage 4.

Table 6: K-M Median Survival (days)

	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
Method A	**273**	**20**	**59**
95% CI	(15, 531)	(4, 36)	(0*, 210)
n	35	24	9
Method B	**118**	**18**	**7**
95% CI	(6, 230)	(12, 24)	(0*, 85)
n	20	21	8
Method C	**394**	**12**	**10**
95% CI	(212, 576)	(1, 24)	(0*, 71)
n	29	30	11
Method D	**401**		
95% CI	(0*, 898)		
n	35		

** Negative numbers were excluded and lower bound set to 0.*

Method A: Assuming that staging is correct; includes censored observations
Method B: Assuming that staging is correct; excludes those lost to follow-up and censored
Method C: Assuming that those in stage 3 who die within two weeks of discharge were actually stage 4; includes censored observations
Method D: Survival of those initially in stage 3

The different coding methods yielded consistent median survival estimates only for patients who initially present in stage 4. For other stages, the use of different rules for coding WHO stage yielded considerably variability in the respective median survival estimates. For example, if I exclude all inpatients classified as stage 3 and who die within two weeks of hospitalisation (Method C), the median survival for stage 3 inpatients increases from 273 to 394 days. Thus, it appears that minor variations in coding do have an impact in survival estimations for stage 3 and other patients.

Patient Transfers/Referrals

Many of the patients who present at GF Jooste are eventually transferred or referred to other health centres. Of stage 3 discharges, 16.7% involved a patient transfer to Brooklyn Chest Hospital (BCH), an inpatient TB treatment facility. Another 14.6% involved a transfer or referral to Groote Schuur Hospital (GSH) for specialist care or follow-up. Of the seven stage 3 GSH transfers, three were for CT scans and two were for PCP or other pneumonias; of the eight GSH transfers among patients initially presenting at stage 4, three were for suspected meningitic illness and two were for other neurological conditions/procedures (data not shown).

Effective utilisation of primary care-level facilities is an important goal within the state health system, and I sought to assess the actual use of local clinics as referrals sites. While referrals to local day hospitals or clinics may not be consistently documented by clinicians, those to local TB clinics require the completion of a separate form (a copy of which is retained in the patient's file). We were therefore able to record the number of documented referrals to these TB specialty clinics.

Table 7: Patient Transfers/Referrals

	Initially WHO Stage 3			Initially WHO Stage 4			Transfer to Stage 4 from 3		
	Cases	*Percent*[1]	*LOS*[2]	*Cases*	*Percent*	*LOS*	*Cases*	*Percent*	*LOS*
Transf to BCH (cases)[3]	8	16.7%[3]	8.8	1	3.4%	*	1	3.8%	*
Transf/Ref to GSH	7	14.6%	2.4	8	27.6%	4.5	2	7.7%	*
Referred to TB Clinic[4]	9	18.8%	6.3	3	10.3%	*	0	0.0%	-

[1] Percent of hospitalisations

[2] GFJ mean length of stay (LOS) reported here.

[3] In stage 3, two patients were each transferred to BSH on two separate occassions, separated by at least six months.

[4] In stage 3, one patient was referred to local TB clinic on two separate occassions, separated by at least 12 months.

* No means reported if number of cases <4

GF Jooste doctors recorded twelve referrals to local TB clinics. Of these, nine had confirmed TB or were given anti-TB medication at GF Jooste (data not shown). This figure could underestimate total referrals to local TB clinics as some doctors may not retain a copy of the referral form in the patient file or note the referral in the patient's chart. Given that 15 cases of TB were newly diagnosed at GFJ, these data suggest that local TB clinics may be adequately utilised by clinicians for follow-up management of TB patients.

Patient Mortality

Patient mortality was quite high among those who initially presented in stage 4 disease. In over one-half of stage 4 admissions, the patient died in hospital or within two weeks of discharge, which compares to only 16.9% in stage 3 hospitalisations. A large majority of those who died in hospital or within two weeks of discharge (6 out of 8 deaths among those initially presenting stage 3 deaths and 10 out of 15 deaths among those initially presenting in stage 4) died during or following their first hospitalisation.

In terms of discharge diagnoses, there was no discernible trend among the patients who died in hospital or within two weeks of discharge. Of the 15 deaths among patients who initially presented at stage 4, four were associated with meningitis or other neurological conditions. Yet,

the prognosis of patients with suspected meningitis was not universally poor; contrary to expectations, only two of the seven total suspected meningitis cases died in hospital or within two weeks of discharge, and only one suspected case of meningitis was lost to follow-up. Thus, the data from this small patient sample do not support any diagnostic or prognostic clues that help distinguish terminal/moribund patients from those in the same disease stage who had better prospects for survival.

Table 8: Patient Mortality

	Initially WHO Stage 3			Initially WHO Stage 4			Transfer to Stage 4 from 3		
	Cases	*Percent*[1]	*LOS*[2]	*Cases*	*Percent*	*LOS*	*Cases*	*Percent*	*LOS*
% Died in GFJ Hospital	5	10.4%	3.6	10	34.5%	2.4	5	19.2%	3.4
% Died <2 wks after d/c	3	6.3%	*	5	17.2%	5.8	0	0.0%	-

[1] Percent of hospitalisations
[2] Mean length of stay (LOS) reported here.

* No means reported if number of cases <4

Patient Costs

General patients costs are presented in tables 9 and 10. Disaggregated expenditures in Table 9 and the patient volume reported in table 10 yield a general cost per inpatient day of R504. This estimate excludes capital costs as well as patient-specific utilisation (e.g., laboratory tests, radiology, diagnostic and treatment procedures, and medications).

Table 9: General Costs at GFJ

Personnel	24,933,077
Adminstrative	342,485
Store & Livestock	5,891,197
Equipment (excl Cap)	226,499
Prof & Spec Services	2,388,403
Miscellaneous	327,251
Total (Recurrent)	**34,108,912**
Patient-Specific Costs	6,453,816
Total (Recurrent, Non-Specific)	**27,655,096**

Table 10: General Costs per Patient

INP days	42,454
OPD visits	25,963
CAS visits	2,857
OPD, CAS % of INP	43%
GFJ General Cost/Day	**504**

Patient-specific costs are reported in Table 11.[††††] The mean total cost for laboratory tests, radiology, diagnostic and treatment procedures, and medications per inpatient day in stage 3 is R151.36. The wide confidence intervals for these estimates suggest that there is a high degree of variability in patient-specific costs. Interestingly, mean spending estimates for the larger categories of expenditures (e.g. radiology and medications) are broadly consistent between stages 3 and 4.

Table 11: Patient Costs (non-hotel costs only)

	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
Mean Cost per Inpatient Da	**151.36**	**112.51**	**50.28**
95% CI	(0.00*, 465.75)	(0.00*, 313.26)	(0.00*, 130.22)
Lab Tests	80.59	43.15	17.53
Diagnostic Procedures	2.20	1.34	0.33
Radiology	19.23	20.48	2.03
Medications, etc.	47.46	46.92	30.39
Tx Procedures, etc.:	1.88	0.61	-
Mean Cost per Hospitallsati	**520.39**	**426.44**	**201.74**
95% CI	(0.00*, 1,309.61)	(0.00*, 1,168.92)	(0.00*, 575.45)
Lab Tests	258.06	151.52	63.03
Diagnostic Procedures	8.45	2.38	1.33
Radiology	64.78	65.67	6.83
Medications, etc.	183.02	205.65	130.56
Tx Procedures, etc.:	6.06	1.22	-

** Negative numbers excluded and lower bound set to zero.*

Laboratory spending is the notable exception. Approximately one-half of patient-specific costs in stage 3 are attributable to such tests, whereas laboratory costs comprised less than 40% of stage 4 costs. Indeed, the difference in laboratory spending between stages 3 and 4 constitutes the bulk of the difference in total spending per inpatient day between these categories.

Relative to other categories, patient-specific costs decline dramatically for patients who progress from stage 3 to 4 and are subsequently hospitalised. Spending on diagnostics (laboratory tests, radiology and procedures) is much lower in this category than in others, perhaps because the treating clinician had a more comprehensive patient history/chart at the time of admission.

[††††] Total patient spending in each category is included as Appendix E.

Expenditure Analysis

In most instances, spending in different categories is principally driven by a single expenditure item (e.g., chest x-rays under "Radiology;" data not shown). However, the magnitude of spending in four sub-categories was not attributable to any single item. These sub-categories and the main expenditure items are reported in Table 12. For example, blood gases made up the largest expenditure item under Lab: Chemistry; a total of R841.32 was spent for these tests during stage 3 hospitalisations.

Table 12: Patient-Specific Expenditures (all hospitalisations in sample)

Initially WHO Stage 3		Initially WHO Stage 4		Transfer to Stage 4 from 3	
Lab: Chemistry					
Blood gases	841.32	Potassium	287.00	Potassium	309.96
Potassium	654.36	Sodium	252.56	Creatinine	264.04
Sodium	608.44	Urea	241.08	Urea	252.56
Urea	562.52	Creatinine	241.08	Sodium	218.12
Creatinine	516.60	Osmolality	149.24	Liver Function Test	59.04
Fe Studies	347.68	Liver Fxn Tests	147.60	Blood gases	44.28
Liver Fxn Tests	332.64	Glucose	91.84	Osmolality	42.64
Osmolality	277.16	CSF ADA	82.00		
Glucose	195.16				
Other	1119.96	Other	202.09	Other	141.04
Lab: Haematology					
Diff count	516.60	Platelets	85.28	-	
WBC	226.32	WBC	78.72	-	
Platelets	223.04	Diff count	73.80	-	
Hb	201.72	Hb	68.88	-	
Other	182.04	Other	36.08	-	
Lab: Microbiology					
TB culture	918.40	CSF Chemistry	195.21	-	
TB sensitivity	747.84	TB sensitivity	124.64	-	
TB microscopy	619.92	TB microscopy	103.32	-	
Blood culture	221.43	CSF Microscopy	103.32	-	
Other	636.90	Other	311.76	-	
Medicine: Antibiotics					
Augmentin (PO)	452.82	Ceftriaxone (IV)	2056.48	Ofloxacin (PO)	354.02
Cefuroxime (IV)	228.02	Cefotaxime (IV)	347.20	Ciprofloxacin (PO)	143.16
Penicillin (IV)	178.18	Cefuroxime (IV)	226.68	Penicillin (IV)	60.42
Flagyl (1g PR)	123.50	Flagyl (1g PR)	123.50	-	
Ofloxacin (PO)	109.72	Penicillin (IV)	94.62	-	
Ciprofloxacin (PO)	100.42	-		-	
Other	500.63	Other	392.37	Other	55.37

It is worth highlighting a few of these findings, which are explored further in the Discussion section. With respect to Lab:Chemistry spending, patients typically received four tests upon admission (potassium, sodium, urea, and creatinine). Many patients also had osmolality, iron studies, and liver function tests while in hospital. Regarding Lab: Haematology spending, only the use of differential counts is noteworthy. Finally, in terms of pharmacy utilisation, antibiotics were the only component that could be further disaggregated; of particular interest, augmentin (a broad-spectrum antiobiotic) was used often in stage 3 patients. In the Discussion section, the implications of these findings will be explored.

VI. DISCUSSION

Statistical Methods

Samples of this size frequently generate large confidence intervals, and several of the inferences could simply be spurious correlations (statistical noise). However, a sample of this size may still allow one to examine several broad trends in the patient composition and attendant costs of HIV care at GF Jooste. These issues are explored in the following sections.

The use of statistical asymptotic theory in this study is admittedly dubious. The sample of GF Jooste hospitalisations is not one of statistically independent events: some patients are admitted as inpatients on multiple occasions, and underlying community factors (e.g., virulent flu season or concentrated flu epidemics) may affect the frequency of hospitalisations. Also, the distribution of LOS and other observable outcomes is unlikely to be normally distributed as I have assumed. However, the use of asymptotics in estimating confidence intervals does help illustrate the large degree of uncertainty around many of the point estimates even if the intervals themselves are technically inaccurate. While stating the computed variance or standard errors would be more precise, lay decision-makers may not as readily understand their meaning. For these reasons, I elected to portray the degree of uncertainty around the point estimates using conventional asymptotics, though I acknowledge the technical weaknesses of this approach.

Descriptive Statistics

The confirmed HIV patient load represents a relatively low volume of total patients (roughly 2%) at GF Jooste over the time period of the research. Of course, only patients with HIV-related symptoms were tested, so the actual prevalence of HIV could be higher. Even so, anecdotal reports suggesting that the proportion of HIV-infected inpatients in the wards may be 40% appear exaggerated. While the proportion of hospital inpatients infected with HIV will inevitably rise as the epidemic matures, the low confirmed HIV patient load suggests that GF Jooste is still in the early stages of the HIV crisis.

Clearly, the confirmed HIV patient volume cannot be correlated to inpatient prevalence with any precision. The point estimate of HIV patient volume at GF Jooste is likely to fluctuate considerably over time: as the tendency changes among clinicians to test patients for HIV, so to will the estimate of HIV among inpatients. For this reason, year-on-year comparisons probably

yield very little useful information. Consistent trends may be more revealing, though individual point estimates shall remain suspect.

Extrapolating a community seroprevalence from the confirmed HIV patient volume is even more problematic. Because HIV testing is largely conducted following a clinical (presumptive) diagnosis of HIV-related illness at GFJ, it is perhaps more appropriate to view the number of HIV confirmed cases as an proxy for AIDS prevalence rather than the underlying HIV prevalence in the communities served by GF Jooste.

The higher proportion of female patients (see Table 1) is likely the result of several factors. First, there is a biological component as the ratio of HIV in men to women in Africa remains about 1.0:1.1. (Department of Health, unpublished data and Dr Gary Maartens, personal communication, 7/12/99). Second, some female patients may have previously been diagnosed as HIV-positive through ongoing antenatal surveillance efforts at state clinics; this factor may explain why females made up only 57.4% of new diagnoses at GFJ (data not shown). Third, females may be more likely than males to seek services from the state hospital system due to a variety of economic and cultural factors (e.g., higher female unemployment, free maternal-child health care, etc.). Given these factors, it is likely that GF Jooste will continue provide HIV-related clinical care to a greater number of women than men in the short- and medium-term.

New HIV and TB Diagnoses

While very few patients apparently knew of their HIV status prior to admission, many of the HIV diagnoses at GFJ were initially clinical or presumptive diagnoses. This suggest that this sample is likely biased towards patients who are symptomatic and/or at discernibly late stages of HIV disease.

Given that most of these diagnoses are new, pre- and post-test counselling issues would have been very important. Yet, such counselling was documented in only eight of the 46 patients tested at GF Jooste (data not shown). Many patients may have been counselled and the clinician, social worker, or counsellor may have simply not included any notes in the chart. However, it is likely that a number of patients received little or no counselling, particularly those patients who speak only Xhosa.

The prevalence of TB among this patient sample is high (see Tables 3 and 5), which is consistent with our expectations given the underlying community prevalence. The patient population is immune suppressed and resides in a TB-endemic area. Because of their level of

immune suppression, however, it is often necessary to make a clinical diagnosis of TB.[‡‡‡‡] Consequently, many patients appear to have been treated either without a lab-confirmed TB result or on the basis of a single AFB- or culture-positive result.

Use of Co-trimoxazole

Co-trimoxazole represents one of the few feasible interventions available within the state medical system. It confers a significant survival benefit, lowers morbidity from a variety of opportunistic infections, and costs only six cents per daily-dose tablet. Noting the importance of this prophylactic medication, the Health Minister has consistently included it on the Essential Drug List as an indicated therapy in later-stage HIV infection.

Unfortunately, however, baseline use of co-trimoxazole appears to be relatively low in this patient population (see Table 4). Co-trimoxazole use was highest among stage 4 patients who had previously been hospitalised in stage 3 disease, but it was consistently low for those initially presenting in either stage 3 or 4. This intervention may help explain the higher median survival among patients who transitioned to stage 4 relative to those who initially present at stage 4.[§§§§] Further, it vaguely suggests that transitioning from stage 3 to 4 may serve as an important "trigger" to clinicians to prescribe preventative interventions.

Interestingly, the use of co-trimoxazole was not related to TB status. This result is somewhat surprising, given that some clinicians, both local and internationally,[46,47] were discussing the use of the drug in co-infected patients at earlier stages of HIV disease during the research period.[*****] Presumably, this discussion would have resulted in a higher proportion of TB-infected patients being prescribed co-trimoxazole. This was not the case as TB status did not seem to impact on the likelihood of co-trimoxazole use.

These data illustrate the large magnitude of benefits could be realised as this intervention becomes more widely used. In order to achieve these patient gains, though, medical superintendents must both increase the use of co-trimoxazole in their own facilities and coordinate patient follow-up and maintenance therapy with day hospitals and local clinics.

[‡‡‡‡] Tuberculosis may not be clearly evident on chest x-rays from an immune-suppressed patient, and such patients are often unable to produce sputum for laboratory analysis.
[§§§§] Of course, the alternative may be true: patients who survive longer may simply be more likely to receive a prescription co-trimoxazole.
[*****] Following published reports that appeared in early 1999, these discussions were formalised and co-trimoxazole is now indicated as an OI-prophylaxis for all patients in Africa co-infected with HIV and tuberculosis in addition to those who are at stages 3 or 4.

Patient Diagnoses at Discharge

The frequency AIDS-defining opportunistic infections (OIs) observed in this sample roughly parallel those reported by Wood et al (1996), though their Cape Town sample was considerably larger. In our sample, however, pulmonary tuberculosis was much more prevalent. This is partially attributable to the different patient samples, though the extent to which this explains the difference is not known.

Among patients in the present study, the high frequencies of gastrointestinal complaints, non-TB respiratory conditions, and candidas are notable (see Table 5). Indeed, these complaints were reported with higher frequency than in the study by Karstaedt et al (1996) and other local studies. Yet, the frequency of these conditions may reflect a supply issue (i.e., patient is admitted because treatment is available) as well as a higher frequency of these illnesses in this population. Further, it may reflect poor clinical management: patients return for repeated episodes or are referred to GF Jooste after being improperly treated at a lower-level facility. For these reasons, it is difficult to make inferences about these relatively high frequencies.

Patient Survival

The discussion of patient survival should be prefaced by an important qualification. Given the retrospective nature of this research, it was not possible to distinguish stage 4 patients more thoroughly using Karnofsky performance scores or other wellness metric scales that evaluate physical functionality/disability. Therefore, if the composition of stage 4 patients changes over time (e.g., more "relatively-well" stage 4 patients with Karnofsky score >40 present at hospital), the median survival estimates reported here may not accurately reflect stage 4 life expectancy.

With that caveat, the median survival of stage 4 patients (see Table 6) remains quite low and the confidence intervals around this estimate are relatively small. It is unclear as to whether this low survival is a result of ineffective clinical interventions or whether these patients were terminal/moribund upon presentation. In either case, the high costs of investigations and treatment medications may represent a poor use of scarce health care resources for patients who initially present at stage 4.

Unfortunately, survival of patients in stage 3 and those that progress from stage 3 to 4 is more difficult to characterise. These estimates have larger confidence intervals and are more sensitive to the coding method used to assess patient stage. For these reasons, it may be

inappropriate to extrapolate from these estimates or to use them in other cost calculations or expenditure modelling projections.

Even with the qualifications to these survival estimates, it appears that GFJ inpatients have a much lower survival period than stage 3 and 4 outpatients followed through GSH outpatient specialty clinic (data not shown). At GSH, stage 3 patients had a median survival of approximately 28 months and stage 4 patients had a median survival of about 17 months.[53] Clearly, then, the GFJ patients are either much more advanced in HIV disease and/or are clinically managed in a less effective manner.[†††††]

Patient Transfers/Referrals

Large numbers of patients in each stage are transferred to other state health facilities (see Table 7). GSH transfers occurred relatively quickly, while those to BCH may have had to be delayed until beds there became available. This supply-side issue may be a large factor in the difference in stage 3 and stage 4 mean LOS as transfers for stage 3 hospitalisations tend to be to BCH while those in stage 4 are more likely to GSH. If BCH turnover improves and beds are more quickly made available, patients in stage 3 would likely spend less waiting time at GFJ hospital, thereby lowering the stage 3 mean LOS.

The provincial medical system has a sizable fiscal incentive to minimise the additional LOS at GFJ once a patient has been placed on the waiting list at BCH. The recurrent cost per patient day at BCH during 1997/98 was R149, while the recurrent cost per patient day at GFJ in the same period was R622.[‡‡‡‡‡] Assuming that the quality of care for chronic illness is at least as good as BCH as at GFJ, the province should seek to maximise the availability of BCH or equivalent facility[§§§§§] beds in order to expedite inpatient transfers.

There are two principal options for increasing BCH or equivalent facility bed availability. The first is to simply increase capacity at BCH or similar facilities. If the waiting time for BCH beds consistently exceeds several days,[******] then increasing the bed capacity at BCH and/or at other facilities may prove cost saving.

[†††††] While both may be true, clinical audits (including post-mortems when necessary) would be required to conclusively determine whether the clinical care afforded to GFJ patients is appropriate and effective.
[‡‡‡‡‡] Cost per bed day for GFJ reported here includes medications, investigations, and laboratory costs as reported by the M Blecher, Western Cape Provincial Administration. Please see Appendix F. Costs per patient day at BCH are less expensive chiefly because of a lower staff to patient ratio.
[§§§§§] DP Marais Hospital (formerly Princess Alice Hospital) near Wynberg would be considered an equivalent facility to BCH, though it does not provide care for multiple-drug resistant TB (MDR-TB) patients.
[******] Dr P Morris, the Medical Superintendent at BCH, suggests that the waiting times usually far exceed one week, though they fluctuate over time and differ for men, women, children, and type of care required.

The second option is to reduce the number of terminal/moribund patients who are transferred to BCH in order to decrease waiting times for other, non-terminal patients. In a small informal sample of HIV-infected patients at BCH (n=54), I found that the six-month mortality rate exceeded 35 percent.[††††††] This high rate suggests that BCH may often provide palliative care for late-stage HIV inpatients, which may effectively "crowd out" other patients and extend waiting times for BCH inpatient beds. However, reducing the number of terminal/moribund inpatients at BCH may increase net provincial medical expenditure if palliative care is instead provided at secondary hospitals with higher costs per patient day. For this reason, the first option allowing a more rapid transfer to GFJ inpatients to BCH of equivalent facility appears preferable.

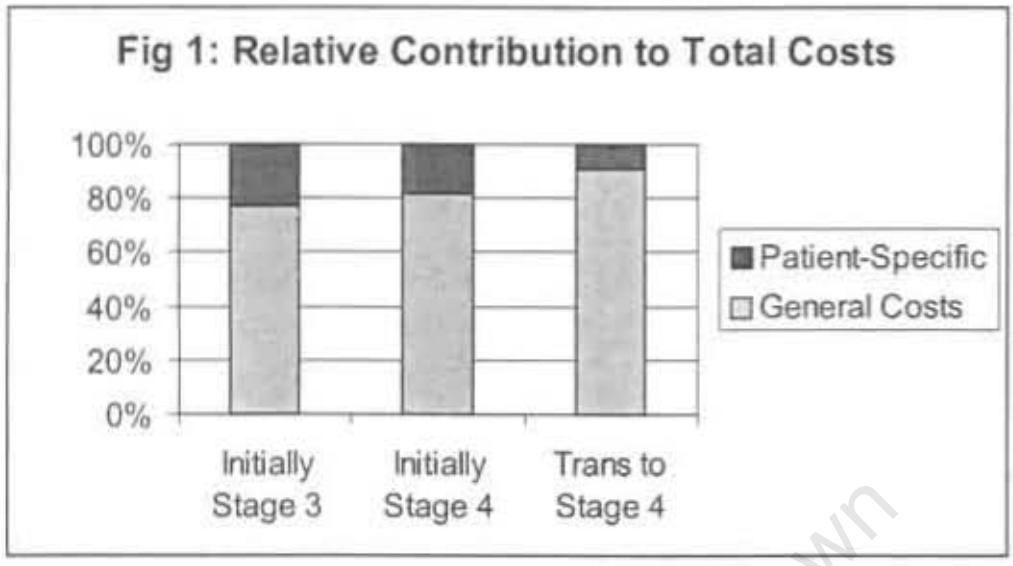
Patient Mortality

A substantial number of patients in this sample died in hospital or within two weeks of discharge (see Table 8). However, the mean length of stay among stage 4 patients who died in hospital or shortly after discharge is cause for concern. These patients could presumably be discharged to home-based care or hospice providers, thereby reducing their LOS. Given the availability of high-quality home-based care providers in the communities surrounding GF Jooste, this represents a viable alternative to inpatient terminal care.[‡‡‡‡‡‡]

Patient Costs

The major component of inpatient costs at every stage of disease is the general (recurrent, non-patient specific) costs. The general costs per inpatient day totalled approximately R500, while the patient specific costs of investigations and treatment were lower than R150. The relative contribution of general and patient-specific costs to overall expenditure per inpatient day is presented in Figure 1.

[††††††] Data provided by Dr P Morris.



One explanation for the declining proportion of patient-specific costs is that lab tests and diagnostic procedures are utilised less often with later-stage HIV inpatients. Additionally, patients with a patient file (and perhaps a clinical history familiar to the clinician) utilise fewer lab and diagnostic procedures. This hypothesis is consistent with the data in Table 11, where spending in these two categories was lower among patients initially presenting in stage 4 and among patients who transferred to stage 4 from stage 3.

Inpatient days should be viewed as the principal driver of HIV-related hospital expenditures because they determine general costs. However, individual expenditure items (e.g., antifungal medications) rather than inpatient days have been the recent focus of cost-containment in HIV care within the provincial medical system. While decreasing specific laboratory or pharmacy utilisation may yield marginal financial gains, reducing the number of total days in hospital would generate substantially higher savings. More attention to reducing inpatient days may therefore be warranted.

One issue merits particular mention in this respect. To decrease total inpatient days, clinicians and administrators must achieve a reduction in present length of stay and/or subsequent hospitalisations. However, undue emphasis on reducing LOS may result in a higher rates of

[::::::] Local home-based care providers include the Red Cross Society, CANSA, St. Lukes, Sisters of Mercy, and a variety of smaller, community-based organisations.

readmission and, as a result, it may inadvertently increase hospital costs. Therefore, LOS should not be used alone as a performance measure or indicator of efficiency.

Several health planners have wrongly argued that reducing LOS for these patients will not result in any meaningful savings to the health system. They suggest that the "general" expenditures (like those above) should instead be regarded as "fixed," primarily because these costs cannot be equated with variable expenses. In this technical respect, these arguments are valid. Indeed, the health system may not experience any nominal reductions in expenditures if LOS is reduced: empty beds might simply be filled with other patients requiring services. However, the expected increase in AIDS diagnoses and the parallel need for AIDS-related inpatient services over the next few years will further strain the existing capacity within the medical system. Thus, reducing LOS in the ways described above would, in essence, expand hospital capacity at a very low marginal cost. Given the available options to enlarge capacity (e.g., building new facilities, etc.), the reduced LOS strategy likely represents the lowest opportunity cost. Therefore, I characterise any reduction in LOS as a positive "savings" to the state hospital system provided that quality of care and health outcomes are maintained.

Comparing disaggregated costs to those reported by Karstaedt et al (1996) yields several interesting contrasts. Perhaps the most striking of which is duration of hospitalisation: the LOS among Karstaedt's patients (8.9 days for stage 3 and 10.7 days for stage 4) was substantially longer – almost double – than that among patients in the present sample. Not surprisingly, total costs per admission (R2,251 and R2,247 for stage 3 and 4, respectively) were correspondingly higher. This may be largely due to differences in mortality: Karstaedt reported a six-month mortality of only 15% and 42% for stages 3 and 4, respectively, which is much lower than the six-month mortality of 37% and 86% among stage 3 and 4 patients in the GFJ sample.

The cost per bed day in the Karstaedt study appears low. Once adjusted for inflation, their estimate remains about R150 than that for GF Jooste. It is unclear whether this difference can be explained by differences in calculation or whether the patient-specific costs at Baragwanath Hospital during the period were lower in real terms than those at GF Jooste in 1997.

Comparing spending between stage 3 and 4 also yield some interesting results.
In Karstaedt's analysis, the costs per admission on laboratory tests increased from stage 3 to stage 4, whereas these costs decreased from stage 3 to 4 among patients in this sample (see Table 11). Second, the costs for medications increased as patients progressed through HIV disease in Karstaedt's research, though the trend in this sample is unclear: compared to those initially presenting in stage 3, the cost for medications was higher among those presenting in stage 4 but

lower for those progressing to stage 4 from 3. It is not clear whether these trends are explained by the higher mortality among GF Jooste patients or whether they reflect a difference in clinical protocols and treatment practice.

Several similarities between this analysis and that by Karstaedt et al warrant mention. First, the proportion of "bed day costs" (approximately 78% of total cost of admission) was roughly equal to the proportion of general costs reported here. Second, the proportion of laboratory, radiology, and pharmacy spending of the total was roughly the same in both analyses.

Collectively, this evidence suggests that Jooste admissions are much less expensive than those at Baragwanath Hospital, a tertiary facility in Gauteng. Also, the data indicated that GF Jooste patients have relatively poorer health outcomes.

It is critical to note that the Baragwanath sample was comprised of those in a separate outpatient cohort, which makes any unqualified comparison with GF Jooste problematic. This pivotal difference suggests that the availability of consistent and perhaps higher quality health care, particularly at a specialty outpatient clinic, may dramatically improve outcomes. This finding is consistent with results reported by Maartens et al (1997), Wood et al (1996), Badri and Maartens (in press), and Post el al (1996), which are discussed earlier in this section. Combining estimates reported by Karstaedt et al (1996) and Kinghorn et al (1996) and adjusting for inflation, such care may cost approximately R5,600 and R16,000 per patient year for stages 3 and 4, respectively, at Baragwanath Hospital. Unfortunately, I am unable to make similar estimates for the Western Cape due to the lack of local outpatient tertiary-level utilisation and cost data.

Expenditure Item Analysis

The findings in this section are based both on my data and a series of informal, confidential interviews with local clinicians. The consistency of responses suggests that the clinical information above is reliable. Given the confidential nature of these interviews, I am likewise unable to list the sources. Even with these qualifiers, the GF Jooste Medical Superintendent found the findings sensible and reasonably accurate.

Cost-containment efforts must be prioritised. First, administrators should formulate plans to reduce total inpatient days per patient. Afterwards, they may elect to review individual expenditures items. While the patient-specific component represent only a small portion of total costs, some savings can be realised in these areas.

Within Lab:Chemistry spending, the standard battery of tests (potassium, sodium, urea, and creatinine) were well represented. However, osmolality, iron studies, and liver function tests were also large expenditure items. This is somewhat surprising, given that the first is in many instances redundant[§§§§§§] and the latter two often yield deranged or inaccurate results in patients with later-stage HIV disease. Also, creatinine may be redundant if a doctor orders a urea chemistry test.

The Lab:Haematology spending seems reasonable, with one caveat. As one reviewing physician noted, the differential count may not provide information that is vital to clinical management. Differential counts may be helpful in deciding whether to initiate prophylaxis in asymptomatic HIV-infected patients, but the vast majority of patients in this sample presented as symptomatic. The value of differential tests is therefore suspect in this context.

The Lab:Microbiology spending appears somewhat low, particularly given the frequency of respiratory infections, gastrointestinal complaints, and suspected meningitic illnesses. Also, two clinician reviewers indicated that the use of TB sensitivities is questionable given the low underlying rate of multiple-drug resistant (MDR) TB in the Western Cape, which is currently about three to five percent. This expense could be justified if clinicians believe that GF Jooste inpatients are disproportionately MDR-TB-infected, but no empirical evidence is available to assess this question.

Regarding spending on antibiotics, two physician reviewers noted that amoxil may be used in place of augmentin (a broad-spectrum antibiotic) for chest complaints. There are certainly trade-offs in terms of resistance patterns, but the use of less expensive antibiotics such as amoxil should be encouraged where clinically appropriate. Also, as a minor point, the oral (PO) dose of flagyl may be better absorbed and is considerably less expensive than the rectal (PR) dose listed here.

In conclusion, individual expenditures items made up only a very small fraction of total patient costs (see Table 11 and Figure 1). Clearly, efforts to reduce spending should be first directed as total inpatient days per patient. Yet, some small level of savings might be achieved with the operational changes described above.

[§§§§§§] Osmolality can be calculated if a doctor has the results from glucose, urea, sodium, and (if possible) potassium tests.

Potential Limitations

This research is inevitably influenced by several sources of error or bias. Several related issues warrant particular attention and are explored below.

A. Sample Bias

The patient sample is left truncated in the sense that individuals in this population required an HIV-diagnosis for inclusion. Some patients were likely tested at antenatal clinics (where active surveillance is conducted) or because a clinician presumed that HIV was the underlying cause of morbidity. Accordingly, the cost estimates from this study are for patients who both seek care and are diagnosed as having HIV-disease at GF Jooste.

B. Reliability of Clinical Abstractors

Regarding the data collection, I informally assessed the reliability of data abstraction between the two principal abstractors, Y Williams and F McGill. Overall, their abstractions reflected a high degree of reliability. Yet, the abstractions did not correlate exactly; this could have resulted from (a) abstractor error or (b) the addition of lab reports, etc. in the lengthy period between the abstractions. Fortunately, however, Dr Williams abstracted much of the data during the winter of 1998, thereby minimising the distortions from time-delays and from multiple abstractors.

I assumed that the ability to diagnosis HIV-disease among clinicians changed little over the sample period. However, should their diagnostic acuity improve or otherwise change in the future, the estimates derived from this sample may not properly reflect inpatient costs because the population under consideration would differ from that here.

C. Utilisation Outside of GFJ

The geographic mobility of this patient population is relatively unknown, though many providers suggest that patients often travel between Cape Town and the Eastern Cape/former Transkei. For this reason, patients may have accessed health care in other districts or hospital regions. If we assume that the mobility of our patient population remains relatively constant over time, our cost estimates remain valid for the Western Cape provincial medical system. Should

patients become less mobile and communities become more static, however, the level of utilisation from the provincial medical system would consequently increase.

Some patients in our sample might also have received care from outpatient clinics or other hospitals within the state system or, more rarely, through private providers. As with access to antiretroviral medications, though, the geography and economic status of our patient population makes it unlikely that many utilised private health care. Further, given limited transportation, I assume that most patients receive their secondary level care primarily from their geographical zone provider (GF Jooste). The effect of these phenomena is probably small, though the effect would be an underestimation of health care utilisation.

D. Underestimates of Utilisation

If patients report different names (e.g., Xhosa and Anglicised aliases) at different admissions, then they may have duplicate files in which their admissions are separately documented. It is difficult to assess the magnitude of this phenomenon, and thus, we may have captured only a portion of the utilisation for some of the 30 patients who gave Anglicised first names.

Also, due to shortcomings in our data sources, we may underestimate actual pharmacy utilisation. This may occur for three principal reasons. First, the drugs dispensed from ward stock may not be consistently noted in the patient's folder. Second, the scripts written at time of discharge may not be included in the patient's records. Indeed, few such scripts were recorded in the charts, which seems particularly strange given that a large proportion of patients required ongoing anti-TB medications. Third, we assumed that patients received the balance of their prescriptions through the outpatient pharmacy at time of discharge. This assumption is problematic as doctors may write a script for the entire treatment course or prophylactic prescription instead of the balance from the original inpatient script. (personal communication, Sr Liz Fielder, Dr Roy Breeds, Dr Douglas Wilson, 15/9/99) However, there does not seem to be consistency in this practice. (personal communication, Drs Breeds and Wilson, 15/9/99)

We may also slightly underestimate laboratory and radiology utilisation. In our abstractions, we counted only those lab tests for which the results were reported and stored in the chart. Tests may have been ordered and no results received. In like fashion, we exclude x-rays that were ordered but for which results are not reported. These phenomena are particularly

confounding among those patients who died in hospital as it is not clear whether the hospital staff performed the tests, radiological exams, and so forth prior to the patient's death.

It is important to note, however, clinicians were most likely to document the more expensive items because these tests or procedures were also the most clinically relevant. For this reason, the undocumented lab tests, etc. are probably among the least expensive.

VII. CONCLUSIONS AND POLICY RECOMMENDATIONS

Despite the limitations discussed above, this research provides the basis for the several conclusions and policy recommendations. While I focus my conclusions and suggestions on clinical care issues and hospital operations at GF Jooste, I also address several system-wide within the state health care structure.

Based on this study, I recommend the following:

1. Increase the use of co-trimoxazole prophylaxis in stages 3 and 4 of HIV disease.

Prescriptions of co-trimoxazole among patients in our sample, all of whom were symptomatic or in advanced disease, were strikingly low (see table 4). Yet, this inexpensive antibiotic represents one of the few feasible drug interventions that alter the course of HIV disease. Greater use of this daily-dose prophylaxis by clinicians would extend the life of many patients.

A ward-based co-trimoxazole program can be implemented with relative ease. Consistent with the forthcoming Treatment Guidelines, all HIV inpatients

- at WHO stage 3 or 4; or
- with tuberculosis; or
- presenting with pyrexia unknown origin (PUO) or unexplained weight loss*******

should be discharged with at minimum one month's supply of co-trimoxazole tablets and be given a letter of referral for day clinics at which the prescription can be refilled. These letters can be pre-printed and be made readily available for the medical officers so that the MO's can complete them quickly.

As part of this effort, medical superintendents also must raise awareness about the importance of co-trimoxazole prophylaxis. Workshops on adherence counselling should be included as part of the training for medical students and as part of continuing medical education. In addition, posters should be put up in the wards and at nurses' stations to remind clinicians of the value of this vital intervention.

The medical superintendent should also consider advocating for a specialist HIV OPD clinic as part of the new GF Jooste outpatient facility. Through a weekly specialty clinic, prevention/prophylaxis interventions that begin at GF Jooste Hospital can be sustained on an

outpatient basis after patients are discharged. As mentioned in the Discussion section, the evidence from Baragwanath as reported by Karstaedt et al and several local studies suggests that improved health outcomes may be related to access to such specialty care.

2. Review treatment protocol for patients initially presenting at WHO stage 4.

Based on these sample data, I conclude that the current practice of treating patients who initially presented at WHO stage 4 is unsustainable and must be reviewed. The expenditure incurred to treat these patients did not appear to extend their lives (see Table 6). However, it is unclear whether patients who initially presented at stage 4 were terminal/moribund upon admission (according to laboratory surrogate markers, Karnofsky score <40, etc.) or whether a poor quality of care contributed in part to the low median survival. For this reason, I suggest that medical superintendents conduct clinical audits to determine the degree to which aggressive, high-quality therapeutic interventions would alter this survival pattern. Based on these results the clinical staff can decide how patients who initially present at stage 4 can best be managed or discharged to alternative hospice or home-based care services.

3. Focus on pain management/palliative care education among clinicians.

Pain management and palliative care is not often considered an acceptable alternative to aggressive clinical intervention for late-stage patients. However, making the patient more comfortable in the terminal stages of disease is an essential component of their clinical management. Accordingly, the most recent HIV Clinical Practice Guidelines for the province have begun to stress the importance of pain management and palliative/terminal care medicine.

Unfortunately, however, there is a general lack of knowledge in pain management and terminal care among many local clinicians. For this reason, medical superintendents should work with the other academic hospitals to include training in this area for medical students and incorporate these issues as part of continuing medical education for other clinical staff. Dissemination of the forthcoming HIV Clinical Practice Guidelines and instruction in their use should be made a priority.

4. Better utilise home-based care alternatives for terminal/moribund patients.

******* These symptoms are indicative of tuberculosis.

The only immediate option for reducing inpatient hospital days is to make better use of terminal and home-based care options for patients in late-stage HIV disease. Fortunately, several local NGO's (particularly the Red Cross Society) provide high-quality care in this respect. Medical superintendents should better network ward MO's with these agencies. In this way, appropriate home-care referrals and transfers can be made quickly and inpatient days for terminal/moribund patients can therefore be minimised. Also, referral forms should be kept readily available at nurses' stations and NGO staff should be invited to present information to clinical staff.

5. Reduce specific laboratory/antibiotic utilisation.

While laboratory costs constitute only a small proportion of total inpatient expenditure for HIV, this spending can, in certain circumstances, be reduced. In particular, clinicians may need to reconsider orders for iron or liver function tests in later-stage HIV disease as the results from such tests are often deranged. Further, the use of differential/CD4 counts is suspect unless the M.O. finds them to be of clear clinical relevance. Additionally, the use of more expensive, broad-spectrum antibiotics should also be examined. Where clinically appropriate, less expensive antibiotics such as Amoxil should be used over Augmentin and others.

However, the respective savings from these items are comparatively small. Hospital administrators should therefore prioritise reducing length of stay and training in palliative care before focusing on specific expenditure items.

6. Increase bed availability at non-acute, chronic care facilities

Delays in the transfer of inpatients from GFJ to BCH have substantial direct costs, particularly as the cost per patient day is roughly R470 higher at GFJ. With large BCH capacity, patients could be more rapidly transferred from acute secondary facilities. Because the present waiting time for a bed at BCH is in excess of one week, these savings from increasing the number BCH or equivalent facility beds could be substantial. [†††††††]

[†††††††] Dr P Morris notes the BCH waiting list has recently grown even longer, particularly because D.P. Marais Hospital is no longer caring for multiple-drug resistant TB and transfers such patients to BCH.

There are two principal options for increasing bed availability BCH or equivalent facilities. The first is to simply increase capacity. The second option is to reduce the number of terminal/moribund patients who are transferred to BCH in order to decrease waiting times for other, non-terminal patients.

The first option appears preferable. Reducing the number of terminal/moribund inpatients at BCH may actually increase net provincial medical expenditure, mainly because such patients are likely to be readmitted to more-expensive secondary hospitals. For this reason, the province should consider expanding patient capacity at BCH or equivalent facilities.

7. Bridge the current gaps in information technology.

Future information technology efforts should focus on two key areas. First, patient records such as the infection control book should be stored electronically, using Access or similar database application. A computer for this purpose has been provided to the Infection Control Sister, though proper training of staff is required before the PC will be used effectively. Second, laboratory and prescription data should be linked to patient database. These improvements would (a) allow clinicians to access past patient care information that is missing from the chart and (b) simplify hospital statistics and record keeping. Additionally, the easy download of such information in a database would enable future researchers/evaluators to replicate this type of exercise with greater accuracy and with considerable time-savings.

8. Introduce unique patient identifiers (UPIs).

The introduction of unique patient identifiers (e.g., Home Affairs-issued ID numbers) across all facilities/agencies is essential. In this way, a patient would be identified by the same UPI at every facility in the state medical system. These identifiers would replace the current systems, which assign patients different folder numbers in each clinic and hospital. The UPIs would greatly assist the integration of existing databases (e.g., pharmacy, laboratory, and admissions) across facilities and improve the continuity of care for patients who access services from different levels within the provincial medical system. In addition, the use of UPIs would greatly assist with the tracking of patient utilisation and mortality; the current system of different folder numbers, etc. severely inhibits research and evaluation in this area.

9. Improve documentation in patient charts.

Substantial amounts of laboratory test results and radiological procedures appear to have been ordered, but the results where never documented in the patient notes or later inserted in the patient files. Considerable expenditures were therefore incurred, but they did not seemingly contribute to or improve the clinical management of patients. While no operational recommendations can be made on the basis of this study, it is clear that this issue deserves much greater attention.

One specific issue does warrant mention. At the rear of the admissions/folders office outside the Casualty Department, several large boxes of laboratory results remain as though discarded. It may be impractical to file all of these individual and somewhat dated results, but at minimum, this practice should be halted.

VIII. SUGGESTIONS FOR FURTHER RESEARCH

The following areas of research would yield information that would improve the accuracy of the cost, utilisation, and other estimates:

- geographic mobility of this patient population (frequency and duration of trips, specifically to the Eastern Cape);
- consistency of utilisation from the geographic zone hospital provider; and
- costing of chest-x-rays and other common radiological procedures within the state medical system.

Further, other cost components of HIV care have not been investigated in this province. Local outpatient utilisation at both the primary care level and tertiary care/specialty clinic utilisation remain unquantified. For a more comprehensive estimate of the costs of HIV-care to the state medical system, these issues must be explored.

ENDNOTES

[1] van Harmelen J; Wood R; Lambrick M; Rybicki EP; Williamson AL; Williamson C. An association between HIV-1 subtypes and mode of transmission in Cape Town, South Africa. Aids, 1997 January, 11(1):81-7.

[2] Maartens G; Wood R; O'Keefe E; Byrne C. Independent epidemics of heterosexual and homosexual HIV infection in South Africa--survival differences. Quarterly Journal of Medicine, 1997 July, 90(7):449-54.

[3] Wood R; Post F. Total lymphocyte count as a surrogate for CD4+ lymphocyte count in African patients coinfected with HIV and tuberculosis. Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology,1996 April 1, 11(4):411-3.

[4] Post FA; Wood R; Maartens G. CD4 and total lymphocyte counts as predictors of HIV disease progression. Quarterly Journal of Medicine, 1996 July, 89(7):505-8.

[5] Post FA; Wood R. Tuberculous pleural effusions in HIV-positive patients [letter]. International Journal of Tuberculosis and Lung Disease, 1998 Nov, 2(11): 941.

[6] Post FA; Wood R. HIV infection is not associated with an increased rate of drug-resistant tuberculosis [letter]. South African Medical Journal, 1997 Jul, 87(7):903.

[7] Wood R; Post FA. Survival of human immunodeficiency virus-infected persons with pulmonary tuberculosis [letter]. International Journal of Tuberculosis and Lung Disease, 1997 Feb, 1(1):87.

[8] Wood R; Post F. Total lymphocyte count as a surrogate for CD4+ lymphocyte count in African patients coinfected with HIV and tuberculosis [letter; comment]. Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 1996 Apr 1, 11(4):411-3.

[9] Post FA; Wood R; Pillay GP. Pulmonary tuberculosis in HIV infection: radiographic appearance is related to CD4+ T-lymphocyte count. Tubercle and Lung Disease, 1995 Dec, 76(6):518-21.

[10] Wood R, EA O'Keefe, G Maartens. The changing pattern of transmission and clinical presentation of HIV infection in the Western Cape region of South Africa (1984-95). South African Journal of Epidemiology and Infection. 1996;11(4):96-98.

[11] Broomberg, Jonathan, ed. The economic impact of the AIDS epidemic in South Africa. Cape Town: Economic Trends Research Group, Development Policy Research Unit, University of Cape Town, 1991.

[12] Hussey G, M Lasser, and W Reekie. The costs and benefits of a vaccination programme for Haemophilus influenzae type B disease. South African Medical Journal 1995; 85(1):20-5.

[13] Opie LH. The total costs and demands of treatment of hypertension in South Africa. Contributions of drug costs, hidden costs and mass strategies. *South African Medical Journal* 1989; 76(3):85-8.

[14] Ehlers W. The Economic Costs of Peritoneal and Hemodialysis. Masters Thesis, Witwatersrand University, Johannesburg: 1992.

[15] de Wet B, D van Schalkwyk, J van der Spuy et al. Paraffin (kerosene) poisoning in childhood--is prevention affordable in South Africa? *South African Medical Journal* 1994; 84(11):735-8.

[16] Masobe P, T Lee, and M Price. Isoniazid prophylactica therapy for tuberculosis in HIV-seropositive patients – a least cost analysis. *South African Medical Journal* 95; 85(2):75-81.

[17] Kinghorn AW, Lee TC, Karstaedt AS, Khuonane B, Schneider H. Care of HIV-infected adults at Baragwanath Hospital, Soweto.. Part I: clinical management and costs of outpatient care. *South African Medical Journal* 1996; 86(11):1484-9.

[18] Karstaedt AS, Lee TC, Kinghorn AW, Schneider H. Care of HIV-infected adults at Baragwanath Hospital, Soweto. Part II: clinical management and costs inpatients. *South African Medical Journal* 1996; 86(11):1490-4.

[19] Peter DL, M McDougall, G Maartens, and BV Girdler-Brown. The costs of AIDS inpatient care [letter]. *South African Medical Journal* 1994; 84(7):448-9.

[20] Health Market International. HIV/AIDS Cost of Care: MSD South Africa Managment Presentation, 15 October 1997, Johannesburg.

[21] du Toit DF. Cost of breast preservation surgery for cancer in the RSA [letter]. *South African Medical Journal* 1992; 82(3):209.

[22] Du Toit DF. Laparoscopic cholecystectomy--hospital costs in South Africa [letter]. *South African Medical Journal* 1992; 81(1):46.

[23] Potgeiter PD. The influence of the tuberculosis epidemic on ICU resources [letter]. *South African Medical Journal* 1995; 85(11):1196.

[24] Wilkinson D, K Floyd and C Gilks. Costs and cost-effectiveness of alternative tuberculosis management strategies in South Africa – implications for policy. *South African Medical Journal* 1997; 87(4):451-455.

[25] Dick J and S Henchie. A cost analysis of the tuberculosis control programme in Elsies River, Cape Town. *South African Medical Journal* 1998; 88(3):380-383.

[26] Sinanovic E. Economic evaluation of community-based TB care in Guguletu, South Africa. UCT Health Economics Unit: June 1998. (in preparation for publication)

[27] Wessels F; Anderson AN; Ebrahim O. Cost-effectiveness of ceftriaxone in the treatment of community-acquired pneumonia in adult hospital patients. A pharmaco-economic study based on a meta-analysis. *South African Medical Journal* 1998; 88(3):251-5.

[28] Marik PE, P Kraus and J Lipman. Intensive care utilisation: the Baragwanath experience. *Anaesthesia and Intensive Care* 1993; 21(4):396-9.

[29] Malan AF, E Ryan, CW van der Elst and R Pelteret. The cost of neonatal care. *South African Medical Journal* 1992; 82(6):417-9.

[30] Söderlund N, K Zwi, A Kinghorn, and G Gray. Preventing vertical transmission of HIV in South Africa – a cost effectiveness analysis. Paper presented to the Annual Conference of the Epidemiological Society of South Africa, Midrand, South Africa, October 25, 1998.

[31] Wilkinson D, K Floyd, and C Gilks. A national programme to reduce mother-to-child transmission is potentially cost-saving: evidence from South Africa. Tygerburg, South Africa (1998): Medical Research Council (published report).

[32] Hellinger FJ. The lifetime cost of treating a person with HIV. J Amer Med Assoc 1993; 270:474-478.

[33] Moore RD, Chaisson RE. Costs to Medicaid of advancing immunosuppression in an urban HIV-infected patient population in Maryland. J Acquir Immune Defic Syndr 1997; 14:223-231.

[34] Rietmeijer CA, Davidson AJ, Foster CT, Cohn DL. Cost of care for patients with human immunodeficiency virus infection; Patterns of utilization and charges in a public health care system. Arch Intern Med 1993; 153:219-225.

[35] Hellinger FJ, Fleishman JA, Hsia DC. AIDS treatment costs during the lst months of life: evidence from the ACSUS. Health Services Research 1994; 29:569-81.

[36] Ruane PJ, Ida J, Zakowski PC, Sokolov RJ, Uman SJ, and Daly R. Impact of newer antiretroviral (ARV) therapies on inpatient and outpatient utilization of healthcare resources in patients with HIV. Conf Retroviruses Opportunistic Infect. 1997 Jan 22-26;4th:112 (abstract no. 262).

[37] Moss N, Kahn JG, Benjamin AE, Wolfe H. Medical care utilization and associated charges for patients with symptomatic HIV disease. AIDS and Public Policy Journal; 6(3): 125-129.

[38] Piette JD, Mor V, Mayer K, Zierler S, Wachtel T. The effects of immune status and race on health service use among people with HIV disease. American Journal of Public Health 1993; 83(4):510-514.

[39] Mor V, Fleishman J, Dresser M, Piette J. Variation in health service use among HIV-infected patients. Medical Care 1992; 30(1): 17-29.

[40] Fleichman J, Mor V, Laliberte L. Longitudinal patterns of medical service use and costs among people with AIDS. Health Services Research 1995; 30(3):403-424.

[41] Andrulius D, Weslowski VB, Hintz E, Spolarich AW. Comparisons of hospital care for patients with AIDS and other HIV-related conditions. JAMA 1992; 267(18):2482-2486.

[42] Deeks SG, Smith M, Holodniy M, Kahn JO. HIV-1 Protease Inhibitors; A review for clinicians. J Amer Med Assoc 1997; 277:145-153.

[43] Palella FJ, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. N Engl J Med 1998; 338:853-60.

[44] Centers for Disease Control and Prevention. Report of the NIH panel to define principles of therapy of HIV infection and guidelines for the use of antiretroviral agents in HIV-infected adults and adolescents. MMWR 1998; 47:1-41

[45] Torres RA, Barr M. Impact of combination therapy for HIV infection on inpatient census (Letter). N Engl J Med 1997; 336:1531-1532.

[46] Rahman A, Deyton LR, Goetz MB, Rimland D, Simberkoff MS. Inversion of inpatient/outpatient HIV service utilization: Impact of improved therapies, clinician education and case management in the US department of veterans affairs (Abstract 433/42429), 12th World AIDS Conference, Geneva, Switzerland, 1998.

[47] Rawlings JE, Holmes J, Belton B, Selwyn P, Friedland G. Changes in HIV/AIDS patterns of care and estimated costs at an urban medical center during the era of HAART (Abstract 442/42430), 12 World AIDS Conference, Geneva, Switzerland, 1998.

[48] World Health Organisation. Acquired immunodeficiency syndrome(AIDS). Interim proposal for a WHO staging system for HIV infection and disease. Wkly Epidemiol Rec 1990; 65:221-224.

[49] Lombard CJ, JC Stegman, and A Barnard. Modelling net expenditure of hospitals in the Cape Province [short report]. South African Journal of Medicine, 1991Nov 16, 80(11): 508-510.

[50] Post, F. Survival of South African HIV-infected patients. Mmed thesis, University of Cape Town, 1998.

[51] Wiktor SZ; Sassan-Morokro M; Grant AD; Abouya L; Karon JM; Maurice C; Djomand G; Ackah A; Domoua K; Kadio A; et al. Efficacy of trimethoprim-sulphamethoxazole prophylaxis to decrease morbidity and mortality in HIV-1-infected patients with tuberculosis in Abidjan, Cote d'Ivoire: a randomised controlled trial. Lancet, 1999 May 1, 353(9163):1469-75.

[52] Badri M; Maartens G; Wood R; Ehrlich R. Co-trimoxazole in HIV-1 infection [letter]. Lancet, 1999 Jul 24, 354(9175):334-5.

[53] Badri, M and G Maartens. Survival of HIV outpatient cohort. (in press).

Appendix A:
Table of Cost Studies

Table: HIV Cost Studies from the U.S.

Data collection through 12-May-97

Author	Data	Notes
Andrulius 92	The article reports data for hospitalized pts.: AIDS / OHIV / Total 1. no. of pts. 16,213 / 11,077 / 27,290 2. LOS 16.4 / 14.4 / 15.7 3. Days per pt. per /yr. 28.4 / 19.4 / 24.7 4. admiss. per pt./yr. 1.7 / 1.3 / 1.6 Costs (SD): per day 785' / 689 / 757 (196) / (180) / (350) per admission 10,998 / 8,413 / 10,156 (6,037) / (6,550) / (6,720) per pt. per yr/ 18,487 / 11,010 / 15,621 (10,198) / (8,299) / (10,779) The article reports charges and revenue figures similar to the data given above for costs.	The article reports data by the 1987 AIDS definition but also uses "other HIV illness" category. They authors suggest that this will help with comparisons using the '92 definition.
Fleischman 94	Six-month utilization of a variety of medical services is reported by disease status: (1) AIDS, (2) symptomatic, and (3) asymptomatic. "Symptomatic" means that patient had some symptoms but no AIDS diagnosis. Std. mean (median) utilization data: AIDS / SYMPT / ASYMPT Ambulatory visits 23.0 / 16.2 / 13.7 (8) / (6) / (5)	Study uses1987 AIDS defintion.

	In-pt. admissions 2.1 (1) 0.7 (0) 0.5 (0) In-pt. avg. LOS -- (9) -- (6) -- (5) In-pt. nights 27.4 (1) 5.9 (0) 5.6 (0) Emergency rm visits. 2.3 (1) 1.1 (0) 0.8 (1) Also reports proportion of those in each disease state which had an in-pt admission, emergency room visit, and/or ambulatory care.	
Hellinger 93	Article reports monthly ACSUS cost data for: (a) AIDS ('87 definition) (b) CD4s<200, no AIDS (c) CD4s 200-500, no AIDS (d) CD4s>500, no AIDS NY State DPH estimates used to estimate long-term care costs for PWAs. 1. In-pt. $ 1890 (68) 456 (46) 119 (28) 54 (19) 2. Out-pt. 380 (14) 344 (35) 191 (44) 151 (54) 3. HHC 174 (6) 80 (8) 21 (5) 10 (4) 4. Drugs 265 (10) 110 (11) 99 (23) 67 (24) 5. Long-term care 55 (2) 0 0 0 *Parentheses = proportion of total* 6. Total cost/mo. 2,764 (2,610-2,918) 990 (842-1138) 430 (353-507) 282 (216-348)	

	Parentheses = 95% CIs	
Hellinger 94	Three-month costs for decedents and survivors, listed by medical service categories. Ambulatory medical visits: $ 1,195 Emergency room visit: $ 164 Home health visits: $ 493 Hospital days: $ 4,424 Drugs: $ 264 Total: $ 6,417 Numbers do not sum to total due to rounding.	Study uses 1987 AIDS definition.
Medi-Cal 96 (unpublished)	Medi-Cal AIDS expenditures under different definitions: 91/92 92/93 Pre-1993: $ 2,048 2,019 1993 Defintion 965 956 Data for 1986-90 is also listed. 89/90 90/91 9/92 92/93 In-pt. expend/day $ 706 737 798 785 Avg. LOS (days) 10.3 9.9 9.3 8.2 *Also reports useful non-medical service utilization data.*	
Moore 96 (unpublished)	Reports monthly Maryland Medicaid expenditures for pts w/ CD4s: (1) 51-200 (2) 201-500, and (3) >500. Found that monthly Medicaid payments were not sig. different for the CD4 groups (2) and (3). This is likely due to the fact the OIs are more common if CD4s < 50. *See attached chart for costs by CD4 group .*	60% of pts. in study were IDUs and were 86% were persons of color. All were Medical pts.

Mor 92	Reports (a) % with emergency room visit, (b) % with in-pt. admission, and (c) number of out-pt. visits for: (a) (b) (c) 1. AIDS pts. 37.9 32.5 see article 2. HIV pts. w/out AIDS 24.6 11.0 see article	
Moss 92	Reports the monthly costs incurred by AIDS and ARC pts. from Jan. 87 to March 88. Out-pt.: $ 261 (rep. out-pt. + emergency rm) Clinic: $ 241 (56% of total) Emergency: $ 20 In-pt: $ 165 (38% of total) (all figures apparently in 1987 dollargs) Mean of 0.04 monthly hospitalizations per pt. which lasted an average of 4.1 days and incurred a mean charge of $4,297. 25% of out-pt. charges were for pharmacy costs.	
Piette 93	Utilization per person-year of (a) admissions, (b) in-pt. days, and (c) out-pt. clinic visits by the following categories: 1. CD4s < 50 2. CD4s = 51-200 3. CD4s = 201-500 Also, it reports rate ratios for each usage outcome: (a) (b) (c) 1. 3.25 3.65 1.54 2. 1.73 1.46 1.28 3. ref ref ref	

Rietmeijer 93	Year-long utilization of services (1990) <u>AIDS pts.</u> (n = 274) Hospitalizations per pt.: 0.86 Days per hospitalization: 8.2 Charges per day: $ 1,349 Charges per pt.: $ 9,588 Out-pt. visits[1] per pt.: 23.7 Charges per visit: $ 345 Charges per pt.: $ 8,177 Total charges per pt.: $17,765 <u>Non-AIDS pts. w. CD4 <200</u> (n = 77) Hospitalizations per pt.: 0.36 Days per hospitalization: 10.4 Charges per day: $ 2,221 Charges per pt.: $ 8,392 Outpt. visits[1] per pt.: 15.4 Charges per visit: $ 278 Charges per pt.: $ 4,294 Total charges per pt.: $ 12,686	A different rate of death (not reported) may affect the utilization and costs associated with each category. Also, data is given for non-AIDS pts. with CD4s >200. Also, this study uses1987 AIDS defintion. If we use a weighted average of the data presented for AIDS and that given for patients without AIDS who have CD4 < 200, we may arrive at reasonable numbers for 1993 CDC definition of pt. W/ AIDS. <u>Results w/ weighted average</u> Hospitalizations per pt.: 0.75 Days per hospitalization: 8.7 Charges per day: $ 1,540 Charges per pt.: $ 9,325 Outpt. visits[1] per pt.: 21.9 Charges per visit: $ 330 Charges per pt.: $ 7,322 Total charges per pt.: $ 16,648
Ruane 97	Comparing July-Dec 94 with Jan-June 96, researchers at Tower clinic in LA found: 1. hospital days per pt. month fell from 3.36 to 1.28 2. skilled nursing/hospice days fell from 136.8 to 48 3. HHC: mean pt. # receiving fell from 67.6 to 28.7 (58%)	

[1] Oupatient figure does not appear to include emergency room charges

	Specific therapies and out-pt. referrals for various procedures fell as well. Data reported in 4th ROI abstract "The Body" reported that Ruane had found: 1. 56% reduction in hospitalization and HHC 2. 80% of pts. experienced rise in CD4 ct. in 96 as compared to 95 3. Fewer pts. have <50 CD4s: 17.3% in 96 as comp. to 28.5% in 95.	
Torres 97	Reported data from St. Vincent's Hospital in NYC: 1. Ambulatory visits by HIV-positive pts. increased 33% from 95 to 96 (includes visits for HIV testing & counseling, early intervention services, primary medical care, etc.) 2. Pts. seen in out-pt. clinc increased 21 % from 95 to 96. 3. In-pt. census dropped by 27% froim 94 to 96 (24% from 95 to 96 alone). From 95 to 96, admissions fell by 10.5%, discharges fell by 9.4%, in-pt. days fell by 23.6%, and avg. LOS fell by 15.9%	Expenditures for all drug Rx's were reported only through October 96. Yet from Jan. to Oct. 96, ZDV, d4T, and 3TC costs increased to levels excedding that of saquinavir. Even though PIs were available only in July 96, we would expect the total expenditures for these drugs to be larger than others due to the much higher unit costs. As this is not the case, it seems likely that this clinic frequently prescribed dual therapies. This makes it difficult to entirely attribute the clinical responses to protease drugs.

Moore Data by CD4 Level

Monthly Medicaid Payments

Category	All	<50	51-200	201-500	>500
Total	1508	2436	1201	1124	1015
15 Inpatient	858	1355	660	674	617
Outpatient Clinic	228	287	209	209	186
Professional Fees	45	39	54	45	39
Pharmacy	248	515	186	126	72
Special Services	23	45	14	12	22

Proportion of Total

Category	All	<50	51-200	201-500	>500
Total	1.00	1.00	1.00	1.01	0.98
Inpatient	0.57	0.56	0.55	0.60	0.61
Outpatient Clinic	0.15	0.12	0.17	0.19	0.18
Professional	0.03	0.02	0.04	0.04	0.04
Pharmacy	0.16	0.21	0.15	0.11	0.07
Emergency	0.02	0.01	0.02	0.02	0.02
Home Care	0.05	0.07	0.05	0.04	0.04
Special Services	0.02	0.02	0.01	0.01	0.02

Appendix B:
Chart Abstraction Form

Patient Information Summary

HIV Medical Utilization Survey

Patient ID: _____

Full Name (FN, SN) _____

Total Hospitalizations since HIV Dx: _____

Abstractor: _____

Date: _____

Reviewer: _____

Disease Information

HIV Dx Date: _____

Dx Date of Stage 1: _____
Dx Date of Stage 2: _____
Dx Date of Stage 3: _____
Dx Date of Stage 4: _____

Presenting Illness*: _____
* *at first admission*

Do Death: _____

Major co-morbidity: _____
(e.g., diabetes, etc.; only if applicable)

Demographics

Sex: *M* *F*

Age: _____

Post Code: _____

Reviewer Comments/Notes:

Referrals

Procedure, etc.	Date	Place

Chart Abstraction Form

HIV Medical Utilization Survey

Patient ID: _____

Full Name (FN, SN) _____

HIV Disease Stage: 1 2 3 4

Hospitilization #: _____

Date In: _____

Date D/C: _____

D/C Status: _____

(i.e., d/c to home, hospice, tranfer, death)

D/C Dx(s): _____

Abstractor Notes:

Referrals & Notes at D/C*:

*Please note place of referral

Reviewer Notes:

Utilization or Referral:

Lab Tests	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Chemistry										
Blood gases										
Sodium										
Potassium										
Chloride										
Urea										
Creatinine										
24-hr. urine collect										
Glucose										
Osmolality										
AST										
ALT										
ALK PHOS										
Total Protein										
Albumin										
Total bilirubin										
GGT										
CK										
Calcium										
Lab Tests (cont'd)	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Phosphate										
Magnesium										
Amylase										
Lipase										
CSF Chemistry										
Haematology										
Hb										
WBC										
Diff count+red cell morph										
Platelets										
Reticulocytes										
ESR										
Coagulation/DIC scrn										
INR										
PTT										
CSF										
Chemistry										
Microscopy										
Culture+sens										
ADA										
Cryptococcal Ag										
Sputum										
TB microscopy										
TB culture										
TB sensitivity										
Microscopy										
Culture										
Sensitivities										
Stool										
Microscopy										
Culture										
Sensitivities										
Urine										
Microscopy										
Culture										
Sensitivities										

Lab Tests (cont'd)	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Serology/Virology/Etc.										
Syphilis/RPR										
Syphilis/FTA										
HIV										
Hep A/B										
Pleural Fluid										
Protein										
TB Culture										
Ascitic Fluid										
Protein										
TB Culture										
Other (specify):										

Dx Procedures:	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Bronchoscopy										
Endoscopy										
Sigmoidiacopy										
Colonoscopy										
Histology										
Biopsy										
Other (specify):										
Other (specify):										

Radiology:	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Chest x-ray										
Cardiac ultrasound										
Abdom. ultrasound										
Brain CT scan										
Chest CT scan										
Abdom. CT scan										
MRI										
Radiology (cont'd):	Date	Result	Date	Result	Date	Result	Date	Result	Date	Result
Other (specify):										
Other (specify):										

Outpatient Consultations:	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral
Respiratory										
Gastroenterology										
Neurology										
Cardiology										
Urology										
Nephrology										
Dermatology										
Gynecology										
General Surgery										
Other (specify):										
Other (specify):										

Medications, etc.:	Date	Dose	Method	# of Days Taken	Date	Dose	Method	# of Days Taken
Specialty								
Ganciclovir								
Acyclovir								
Other (specify):								
Anti-TB								
Pyrifin								
Streptomycin								
Pyridoxine								
Ethambutol								
Isoniazid								
Pyrazinamide								
Rifampicin								
Ethionomide								
Other (specify):								

Medications, etc.: (cont'd)	Date	Dose	Method	# of Days Taken	Date	Dose	Method	# of Days Taken
Other Antibiotics								
Bactrim								
Penicillin								
Gentamycin (IV)								
Erythromycin (IV)								
Flagyl								
Cloxacillin								
Cefuroxime								
Cefotaxime								
Amoxil								
Augmentin								
Flucloxacillin								
Ciprofloxacin								
Other (specify):								
Anti-fungals								
Fluconazole								
Ketoconazole								
Amphotericin B								
Nystatin								
Other (specify):								
Pain relief								
Pandeine								
Doxyphene								
Brefen								
Pethidine								
Morphine								
Other (specify):								
Miscellaneous								
Fluids								
Blood								
Lasix								
Kloref								
Oxygen								
Bandages and dressings								
Vit/Food Supplement								
Medications, etc.: (cont'd)	Date	Dose	Method	# of Days Taken	Date	Dose	Method	# of Days Taken
Immodium/Maxalon								
Buscopan								
Haematinics								
Other (specify):								

Tx Procedures, etc.:	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral
Pleural tap										
Pericardial tap										
Naso-gastic tube										
Artificial ventilation										
Surgery (specify):										
Physiotherapy										
Other (specify):										
Other (specify):										

Miscellaneous:	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral	Date	Place of Referral
Social work										
Counselling										
Home health care										
Speech										
Occupational										
Other (specify):										

Appendix C:
Unit Cost Data

Unit Cost Data

Sources: 1996/97 SAIMR tariffs, provincial drug tenders and catalogue prices, MASA rates

Lab Tests	*Price*	*Notes*
Chemistry	-	
Blood gases	44.28	
Sodium	11.48	
Potassium	11.48	
Chloride	8.20	
Urea	11.48	
Creatinine	11.48	
24-hr. urine collect.	11.48	
Glucose	11.48	
Osmolality	21.32	
AST	16.40	
ALT	16.40	
ALK PHOS	16.40	
Total Protein	9.84	
Albumin	9.84	
Total bilirubin	13.12	
GGT	16.40	
CK	16.40	
Calcium	11.48	
Phosphate	11.48	
Magnesium	11.48	
Amylase	16.40	
CSF Chemistry	21.69	
CSF ADA	16.40	
Pleural fluid protein	9.84	
Pleural fluid ADA	16.40	
Pleural fluid LDH	16.40	
Pleural fluid specific gravity	21.72	
Pleural fluid poly	11.84	
Pleural fluid ly	11.84	
B-HCG	39.36	
Beta HCG (urine screen)	37.72	
Corrected Ca	21.32	
LDH	16.40	
Phenytoin levels	34.44	
Pregnancy	37.72	Assumed urine screen was peformed
Theophylline level	34.44	
TSH	39.36	
Urinary Na	11.48	
Urine creatinine clearance	11.48	
Urinary Osmolality	21.32	
Urinary sodium	11.48	
Fe Studies	86.92	
Ferritin	39.36	
B12	36.08	
Folate	37.72	
Red Cell Folate	37.72	
Pleural fluid glucose	11.84	
Pleural fluid Cl	8.20	
Haematology	-	
Hb	4.92	
WBC	4.92	
Diff count+red cell morph	24.60	
Platelets	6.56	
Reticulocytes	6.56	
ESR	6.56	
INR	14.76	
PTT	19.68	
Direct coombs	11.48	
Malaria smear	11.48	

Microbiology	-	
CSF	-	
Chemistry	21.69	
Microscopy	11.48	
Culture+sens	18.04	Assumed no growth
Sputum	-	
TB microscopy	11.48	May be overestimate; could have been a miscoded ZN
TB culture	32.80	
TB sensitivity (at least 2 drugs)	62.32	
Microscopy	18.04	Cost of microscopy includes culture
Culture	-	
Sensitivity	52.48	Sensitivity cost is per organism isolated
Stool	-	
Microscopy	13.12	
Culture	-	
Sensitivities	44.28	
Urine	-	
Microscopy	16.40	
Culture	-	
Sensitivities	44.28	
Pleural Fluid	-	
TB Culture	32.80	
WCC	4.92	
Other	-	
Blood culture	20.13	
Pus swab	27.88	
Serology/Virology/Etc.	-	
Syphilis/RPR	6.56	
Syphilis/FTA	18.04	Assumed that second test was done
Rapid Screen	31.16	
ELISA	21.32	
CSF Cryptococcal Ag	14.76	
CSF FTA	18.04	
Paul Brunnel	6.56	
Widal	16.40	
Other	-	
TCA Level (Toxicology)	34.44	
Dx Procedures:		
Sigmoidiscopy	149.00	MASA Code 1676; 1996 Sc/B rate for specialist reported
Biopsy (FNAB)	49.80	MASA Code 1457; 1996 Sc/B rate for specialist reported
ECG (sinus tachycardia)	34.50	MASA Code 1232; 1996 Sc/B rate for specialist reported
ECG	34.50	MASA Code 1232; 1996 Sc/B rate for specialist reported
ECG (arial plutter)	34.50	MASA Code 1232; 1996 Sc/B rate for specialist reported
Exam under anaesthetic	-	*this procedure is likely redundant with sigmoidiscopy*
LN FNAB	49.80	MASA Code 1457; 1996 Sc/B rate for specialist reported
Radiology:		
Chest x-ray	59.20	MASA Code 3445; 1996 Sc/B rate reported
Abdominal ultrasound	187.00	MASA Code 3627; 1996 Sc/B rate reported
Abdominal X-ray	59.20	MASA Code 3477; 1996 Sc/B rate reported
AXR	59.20	MASA Code 3477; 1996 Sc/B rate reported
X-ray lumbar spine	115.50	MASA Code 3323; 1996 Sc/B rate reported
Venogram	115.50	MASA Code 3545; 1996 Sc/B rate reported
Dopplers	145.90	MASA Code 3635; 1996 Sc/B rate reported
Outpatient Consultations:		
ENT	-	MASA Code 0101 - ENT or Physician (18) short consultation 60.00 *not included because pt was ref to GSH*

Medications, etc.:	Price	Comments
Anti-TB	-	
Pyrifin (total # tabs PO)	0.36	
Streptomycin (1.2g PO)	2.58	Physician reviewer stated that the dosage should be 1000mg IM
Streptomycin (1g IM)	2.58	
Streptomycin (750mg IM)	2.58	
Pyridoxine (total # tabs)	0.03	
Pyridoxine (25mg PO)	0.03	
Ethambutol (1200mg PO)	0.35	
Ethambutol (1000mg PO)	0.35	Physician reviewer stated that the dosage should be 1200mg
Ethambutol (800mg PO)	0.23	
Ethambutol (400mg PO)	0.12	
Ethambutol (2 tabs PO)	0.23	
Isoniazid (400mg PO)	0.05	Physician reviewer stated that the dosage should be 300mg, but I included 400mg as it was possible
Isoniazid (300mg PO)	0.04	
Isoniazid (320mg PO)	0.04	Physician reviewer stated that the dosage should be 300mg
Isoniazid (200mg PO)	0.03	
Isoniazid (4 tabs PO)	0.05	Physician reviewer stated that the dosage should be 300mg, but I included 400mg as it was possible
Pyrazinamide (1500mg PO)	0.08	
Pyrazinamide (1250mg PO)	0.05	Physician reviewer stated that the dosage should be 1000mg
Pyrazinamide (1200mg PO)	0.05	Physician reviewer stated that the dosage should be 1000mg
Pyrazinamide (1000mg PO)	0.05	
Pyrazinamide (800mg PO)	0.05	Physician reviewer stated that the dosage should be 1000mg
Pyrazinamide (500mg PO)	0.03	
Pyrazinamide (450mg PO)	0.03	Physician reviewer stated that the dosage should be 500mg
Pyrazinamide (4 tabs PO)	0.11	
Rifampicin (600mg PO)	0.82	Assumed that 150mg tablets were dispensed
Rifampicin (450mg PO)	0.61	
Rifampicin (400mg PO)	0.61	Physician reviewer stated that the dosage should be 450mg
Rifampicin (300mg PO)	0.41	
Rifampicin (4 tabs PO)	0.82	
Ethionomide (1000mg PO)	3.26	
Ethionomide (750mg PO)	2.44	
Ethionomide (total # tabs PO)	0.81	
Pyrifin - Rifater (4 od PO)	1.44	
Pyrifin - Rifater (5 tabs PO)	1.80	
Pyridoxine (25mg PO)	0.03	
Other Antibiotics	-	
Bactrim (total # tabs PO)	0.06	
Bactrim (80mg PO)	0.06	
Penicillin (4 MU IV)	5.04	Bolus dose includes cost of 2ml syringe and needle
Penicillin (2.4 MU IM)	3.90	
Penicillin (2.4 MU IV)	3.90	Bolus dose includes cost of 2ml syringe and needle
Penicillin (2 MU IV)	2.76	Bolus dose includes cost of 2ml syringe and needle
Penicillin (1 MU IV)	1.62	Bolus dose includes cost of 2ml syringe and needle
Penicillin (500mg PO)	0.14	
Penicillin (# of tabs)	0.07	
Gentamycin (360 mg IV)	5.40	Includes cost of mini-bag, 2ml syringe, and needle
Gentamycin (320 mg IV)	5.17	Includes cost of mini-bag, 2ml syringe, and needle
Gentamycin (320 mg IM)	1.16	
Gentamycin (200 mg IV)	5.06	Physician reviewer stated that the dosage should be 240mg, but I included 200mg as it was possible
Gentamycin (180 mg IV)	4.95	Physician reviewer stated that the dosage should be 160mg, but I included 180mg as it was possible
Gentamycin (120 mg IV)	4.89	Includes cost of mini-bag, 2ml syringe, and needle
Erythromycin (IV)	45.82	Includes cost of mini-bag, 2ml syringe, and needle
Flagyl (400mg PO)	0.05	
Flagyl (1g PO)	0.13	
Flagyl (1g PR)	9.50	
Flagyl (500mg IV)	7.53	Includes cost of mini-bag, 2ml syringe, and needle
Cloxacillin (1g PR)	4.24	
Cloxacillin (400mg PO)	0.18	Physician reviewer stated that the dosage should be 500mg

Cloxacillin (500mg PO)	0.18	
Cefuroxime (750mg IV)	14.41	Includes cost of mini-bag, 2ml syringe, and needle
Cefuroxime (250mg IV)	11.82	Includes cost of mini-bag, 2ml syringe, and needle
Cefuroxime (250mg PO)	2.70	
Cefotaxime (2g IV)	47.89	Includes cost of mini-bag, 2ml syringe, and needle
Amoxil (250mg PO)	0.22	
Amoxil (500mg PO)	0.45	
Augmentin (375 mg PO)	2.12	
Flucloxacillin (250mg PO)	0.35	
Ciprofloxacin (500mg PO)	5.66	
Ciprofloxacin (400mg PO)	5.66	Physician reviewer stated that the dosage should be 500mg
Ciprofloxacin (250mg PO)	2.88	
Ciprofloxacin (200mg PO)	2.88	Physician reviewer stated that the dosage should be 250mg
Ampicillin (1g IV)	7.61	Includes cost of mini-bag, 2ml syringe, and needle
Doxycycline (100mg PO)	0.11	
Ofloxacin (200mg PO)	4.22	
Ofloxacin (400mg PO)	7.87	
Ceftriaxone (2g IV)	133.02	Includes cost of mini-bag, 2ml syringe, and needle
Anti-fungals	-	
Amphotericin B (2ml PO)	62.96	Assumed that injection was coded incorrectly; should be 50mg/2mL
Amphotericin B (lozenges)	1.18	
Nystatin (pessaries)	0.53	
Fluconazole (30mg PO)	19.93	Physician reviewer stated that the dose should be 100mg
Nystatin (1ml PO)	0.16	
Nystatin (2ml PO)	0.31	
Nystatin (5ml PO)	0.79	
Nystatin cream	0.57	Assumed that tube had 20 doses
Nystatin (total # of tabs)	0.59	
Mycostatin (1 ml PO)	6.37	
Clotrimazole (pessaries)	14.25	
Clotrimazole (500mg PO)	14.25	
Analgesics/Anti-inflammatory/An	-	
Pandeine (total # tabs PO)	0.09	
Pandeine (1g PO)	0.18	
Doxyphene (total # tabs)	0.21	
Ibuprofen (400mg PO)	0.07	
Pethidine (50mg IMI)	1.11	
Morphine (10 ml PO)	1.05	Assumed that this was coded incorrectly and dose should be 10mg IM
Morphine (5 ml PO)	1.05	Assumed that this was coded incorrectly and dose should be 10mg IM
Codeine (# of tabs)	0.73	
Codeine phosphate (30mg PO)	0.73	
Idomethacin supp. (tab PR)	0.39	
Panado (total # tabs)	0.03	
Paracetamol (1g PO)	0.07	
Diclofenac (25mg PO)	0.03	
Diclofenac (75mg IM)	1.12	
Buscopan (1 amp IVI)	9.08	Bolus dose includes cost of 2ml syringe and needle
Buscopan (10mg PO)	0.06	
Buscopan (2mg tds PO/IVI)	0.61	Physician reviewer stated that the dose should be 20mg bolus dose
Buscopan (total # of tabs PO)	0.06	
Lorazepam (1mg PO)	0.03	
Serenace (5mg IM)	0.53	
Diazepam (10mg IV)	2.08	Bolus dose includes cost of 2ml syringe and needle
Diazepam (5mg IV)	1.28	Bolus dose includes cost of 2ml syringe and needle
Diazepam (5mg PO)	0.02	
Fluids/Blood	-	
Fluids (1L 1/2 n/s)	8.75	1998 prices deflated by 10% as per pharmacist's suggestion
Fluids (200 mL n/s)	6.69	
Fluids (500 mL n/s)	8.32	
Fluids (1L n/s)	8.32	
Fluids (1L ringers)	8.79	
Fluids (1.5 L n/s)	16.64	
Fluids (2 L n/s + 5% dextrose)	17.80	
Fluids (1 L NaCl)	8.32	

Rehydration fluid (1 L) 1/2 N/S	9.14	
Rehydration fluid (1 L)	9.14	
Rehydration fluid (1 L) + 1 amp	18.54	
Maintelyte (1 L IV)	9.05	
Blood (total # units)	270.06	1999 prices deflated by 8% annually
Diabetic Drugs	-	
Actraphane (4 u s/c)	0.43	
Actraphane (8 u s/c)	0.54	
Actraphane (10 u s/c)	0.60	
Actraphane (12 u s/c)	0.65	
Actraphane (15 u s/c)	0.73	
Actraphane (20 u s/c)	0.87	
Actraphane (24 u s/c)	0.97	
Actraphane (25 u s/c)	1.00	
Actrapid (units IV)	7.20	Includes cost of 200ml bag, 2ml syringe, and needle
Gliclizide (40mg PO)	0.16	
Gliclizide (80mg PO)	0.16	
Insulin (sliding scale)	0.32	
Metformin (500mg PO)	0.07	
Anti-asthmatic/corticosteroids	-	
Adrenaline (8amps IV)	7.91	Includes cost of 200ml bag, 2ml syringe, and needle
Attronvent (Neb)	1.50	
Dexamethazone (4mg PO)	1.16	
Berotec Nebs (1:4 neb)	7.84	
Hydrocortisone (100mg IV)	4.35	Bolus dose includes cost of 2ml syringe and needle
Metalozone (5mg PO)	1.13	
Prednisone (total # tabsPO)	0.05	
Ventolin (Neb)	0.88	
Vitamin/Mineral Supplements	-	
Kloref (total # tabs PO)	0.41	
Slow K (total # tabs PO)	0.07	
KCl (1 amps IV)	8.92	
Multivits/Food Supplement	0.26	
FeSO4 (total # tabs PO)	0.03	
Fe Sulphate (total # tabs)	0.03	
Haematinics	0.03	
Kexelate (1g PO)	0.52	
Calcium phosphate 10% (10ml	-	Drug and/or drug price not presently available in Western Cape
Folate (5mg PO)	0.02	
Multivits (total # tabs PO)	0.26	
Multivits (5mg PO)	0.26	
Slow Mg (total # of tabs)	0.23	
Thiamine (100mg PO)	0.09	
Vit BCG (total # tabs)	0.82	
Vit BCO (total # tabs PO)	0.82	
Miscellaneous	-	
Anti-coagulants	-	
Hepann (25000 u IV)	40.37	Includes cost of 1000ml bag, 2ml synnge, and needle
Warfarin (10mg PO)	0.20	
Anti-diarrhoeals	-	
Immodium (total # tabs)	0.03	
Immodium (2mg – each one tat	0.03	
Anti-emetics	-	
Maxalon (10mg PO)	0.02	
Maxalon (10mg IVI)	20.38	Bolus dose includes cost of 2ml syringe and needle
Maxalon (10mg IM)	20.38	Assumed that IM was same as IV cost
Maxalon (1 mg tds PO/ICVI)	0.02	Physician reviewer stated that the dose should be 10mg
Stemetil (1amp IV)	1.94	Bolus dose includes cost of 2ml syringe and needle
Beta-blockers	-	
Atenoloi (50mg PO)	0.09	
Digoxin (125mg PO)	0.03	Assumed that 0.25mg was intended dose
Diuretics	-	
Lasix (240mg PO)	0.19	
Lasix (200mg PO)	0.16	

Lasix (160mg PO)	0.13	
Lasix (160mg IV)	40.81	Includes cost of minibag, 2ml syringe, and needle
Lasix (120mg PO)	0.10	
Lasix (80mg IV)	22.65	Includes cost of minibag, 2ml syringe, and needle
Lasix (40mg IV)	9.56	Bolus dose includes cost of 2ml syringe and needle
Laxatives	-	
Metamucil (10ml PO)	0.21	
Senekot (total # of tabs PO)	0.05	
Other	-	
Adalat (5mg S/L)	0.17	
Amitriptiline (25mg PO)	0.03	
Albendazole (100mg PO)	0.02	
Betadene mouthwash	3.62	
Bromocriptine (2.5mg PO)	2.13	
Calamine lotion (apply to affecte	0.05	Assumed 20 dosages per tube
Phenytoin (300mg PO)	0.28	
Ramipril (2.5mg PO)	0.64	
Ramipril (5mg PO)	0.64	
Stores	-	
Oxygen (FMO2 40% if needed)	8.64	1999 prices deflated by 8% annually
Bandages and dressings	3.06	1999 prices deflated by 8% annually
IV drip line + 1 needle	3.92	1999 prices deflated by 8% annually; Assumed 50-cent price of needle
Neb mask	7.67	1999 prices deflated by 8% annually
Tx Procedures, etc:		
Pleural tap	49.80	MASA Code 1145; 1996 Sc/B rate for specialist reported
Pericardial tap	191.50	MASA Code 1248; 1996 Sc/B rate for specialist reported
Naso-gastic tube	35.30	MASA Code 3419; 1996 Sc/B rate for specialist reported
ICD inserted	191.50	MASA Code 1141; 1996 Sc/B rate for specialist reported
Physiotherapy referral	-	

Appendix D:
Other Diagnoses

"Other" Discharge Diagnoses (total cases)

Diagnoses	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
Anaemia	2		
Bicytopaenia	1		
Dehydration			2
DKA	1		
Hypokalaemia			1
Myositis		1	
Neurological conditions*			
CVA susp	1		
Seizures/epilepsy	1	1	1
Rectal bleeding/fissures	2		1
Ringworm (diffuse)		1	
Seborrhoeic dermatitis	1		
Trauma: leg wound	1		

* "Other neurological conditions" in Table _ count encephalopathy and vacuolar myelopathy/paraplegia as OIs.

Appendix E:
Total Patient Spending

Gross Expenditures (non-hotel costs only; all hospitalisations in sample)

	Initially WHO Stage 3	Initially WHO Stage 4	Transfer to Stage 4 from 3
Lab Tests	**12,387.09**	**4,394.14**	**1,638.73**
Chemistry	5,455.84	1,694.49	1,331.68
Haematology	1,349.72	342.76	16.40
Microbiology	3,144.49	838.25	275.89
Serology	2,402.60	1,518.64	14.76
Other	34.44	-	-
Diagnostic Procedures	**405.80**	**69.00**	**34.50**
Radiology	**3,109.50**	**1,904.50**	**177.60**
Medications, etc.	**8,785.10**	**5,963.90**	**3,394.46**
Analgesics, etc.	102.17	43.87	120.85
Anti-asthmatics, etc.	381.24	10.23	66.02
Antibiotics (excl TB drugs)	1,693.30	3,240.85	612.97
Anti-fungals	108.95	435.49	125.05
Anti-TB	267.72	93.69	117.94
Fluids/Blood	5,623.13	1,761.41	1,127.16
Stores	213.96	86.26	133.14
Vitamin/Minerals	141.39	56.45	247.33
Miscellaneous	253.24	235.65	844.00
Anti-coagulants	42.35	-	-
Anti-diarrhoeals	0.54	0.26	3.10
Anti-emetics	63.13	184.23	166.02
Beta-blockers	0.60	-	0.56
Diabetic Drugs	14.12	-	22.85
Diuretics	90.93	38.25	632.83
Laxatives	3.26	-	-
Other	38.31	12.92	18.64
Tx Procedures, etc.:	**291.10**	**35.30**	**-**
	-	-	-
TOTAL	**24,978.59**	**12,366.84**	**5,245.29**

Appendix F:
BCH Cost per Patient Day

BCH cost/day calculation for 1997/98

BCH Exp (recurrent)	15,396,232
INP days*	103,230
OPD visits	-
CAS visits	-
OPD, CAS % of INP	-
BCH cost/day	149

(*Includes private INP days.)

Disaggregated Expenditures

Personnel	12,390,844
Adminstrative	196,466
Store & Livestock	2,141,485
Equipment (excl Cap)	46,305
Prof & Spec Services	443,053
Miscellaneous	178,079
Total (Recurrent)	15,396,232
Patient-Specific Costs	666,666
Total (Recurrent, Non-Specific)	14,729,566
Capital	80,356
Total (Recurrent + Capital)	15,476,588