COST OF INPATIENT CARE FOR HIV-POSITIVE PATIENTS AT RED CROSS CHILDREN'S HOSPITAL, CAPE TOWN

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There is anecdotal evidence that certain categories of patients at Red Cross War Memorial Children's Hospital (RCH) are thought to be utilising more resources than others. Faced with an ever-increasing demand for care, shrinking budgets and tough measures by government to force health managers to operate within budget, bold decisions need to be taken regarding future admission policy. The *aim* of this retrospective record-based study was to assess the cost of inpatient care for paediatric HIV-positive patients at RCH over a 1-year period (January - December 2001). The *objectives* were (*i*) to determine the cost of inpatient care for paediatric HIV-positive patients; and (*ii*) to provide baseline data for health managers to develop future admission policy and to plan for future needs in terms of management and budgetary protocols.

Methods. The study population consisted of HIV-positive inpatients admitted to RCH. Information on patients' demographic details, date and duration of admission, reason for admission, additional diagnosis, nutritional status, laboratory investigations done, surgical procedures performed and medication prescribed were obtained from the patient records. Direct costs were recorded for admissions (bed costs), X-rays, laboratory and surgical procedures. The tariff fees charged for these services were obtained in consultation with management at RCH.

Results. There were 16 032 admissions to RCH in 2001. Of these patients 616 (4%) were HIV+. A 25% random sample ($N = 154$) with a mean age of 1.75 years was analysed. Almost 80% were admitted with diarrhoea and vomiting and/or chest problems. The mean number of previous admissions was 2.0. The most common conditions diagnosed clinically were failure to thrive (64%), pneumonia (54%), gastroenteritis (43%), oral thrush (42%) and tuberculosis (22%). Over half were found to be underweight for their age, 20% were marasmic and 87% suffered some form of malnutrition at admission. HIV+ patients were 4.7 times more likely to die in hospital than HIV-ve patients. Their average length of stay in hospital was 9 days, compared with 4 days for HIV-ve patients. HIV+ patients consumed 12%, 61% and 9% of the total budgets allocated for antibiotics, antifungals and analgesics, respectively (7% of the total budget for medicines). The average cost (direct cost) for each HIV+ inpatient amounted to R18 765.76. Admission (bed) costs formed the bulk of this amount (84%) followed by laboratory costs (9%), medication (3%), surgical (2%) and X-rays (2%). Alarmingly, HIV+ patients, who formed 4% of the total admissions, consumed 26% (R11.56 million) of the total budget for direct treatment costs (R44.65 million).

Conclusion. The current admission policies regarding HIV+ patients to RCH appear unsustainable, given the continued high demand for care, an ever-increasing HIV pandemic, the non-availability of antiretroviral therapy, lower health budgets and the continued inability of these patients to pay for health services.

The prevalence of HIV infection in the Western Cape lags behind that of the rest of the country and sub-Saharan Africa.[1,2] However, the prevalence rate for women attending antenatal clinics in this province has almost doubled from 3.09% to 6.29% between 1996 and 1997,[3] indicating a significant increase in the rates of new infection of HIV. This trend has continued (8.6% – Provincial Administration of the Western Cape, annual antenatal survey results, 2001)[3] and has major cost implications for public hospitals that provide specialised care for paediatric HIV patients. One simply has to look beyond the debate of government's failure to provide antiretrovirals to reduce mother-to-child transmission of HIV and deal with the realities and cost implications of providing care for children with HIV. This

scenario must be seen in the context of a decision taken by the National Department of Health to cut the budget for highly specialised services by R50 million from 1 April 2002.[4] It is envisaged that these cuts in the budget will be more than quadrupled in the next 5 - 8 years. The implications for Red Cross War Memorial Children's Hospital (RCH) are tremendous – it now has to provide specialised quality care for growing numbers of paediatric HIV-positive patients in an environment where financial resources are constantly being reduced by government so that other priority areas can also receive funding.

The specialised care offered to paediatric HIV-positive patients at RCH needs to be costed to provide administrators of the hospital with detailed information as to how much of the current budget is used up in providing care for these patients. Future planning in terms of patient admission protocols, laboratory services, length of stay in hospital, medicine costs, surgical procedures, home-based care initiatives and priorities for non-HIV patients will be directly affected by this costing exercise and ultimately administrators will have to make bold decisions on the best way to spend scarce resources in providing quality care for children admitted to RCH.

LITERATURE REVIEW

Most health economists and HIV/AIDS experts support the view that antiretroviral (ARV) drugs are a cost-effective alternative when compared with the costs of providing care for infected infants who are born HIV positive.[5] Havens *et al.*[6] investigated the lifetime cost of care for children with HIV infection. Based on a median survival time of 120 months, the mean lifetime charges for hospital-based care for children with HIV infection was approximately U$408 307. Their data suggested an extremely beneficial economic impact of the implementation of CDC recommendations for universal counselling and voluntary testing of pregnant women, coupled with AZT treatment of pregnant women with HIV infection and their newborn infants to reduce perinatal mother-to-child transmission (MTCT). In a similar study in the Cape Town Metropole, Roux *et al.*[7] investigated the burden and cost of inpatient care for HIV-positive paediatric patients. They found that 106 (8.3%) HIV patients occupied these beds at the time of the survey. Furthermore, 25% of the HIV-infected children received oxygen, 46% received intravenous foods or drugs, 81% had some form of malnutrition and 46% were underweight for their respective ages. Tuberculosis (TB) was diagnosed in 20% of the HIV-positive children. This was a higher prevalence than previously found in hospitalised children in this region and was thought to be related to the effect of immunodeficiency on susceptibility to TB.

Based on a daily bed cost of R280 per day, the annualised cost of paediatric beds for a constant number of 57 HIV-positive inpatients was found to be R5 825 400. The estimated lifetime hospitalisation cost for an infant diagnosed at 13 months (the median age for acute admissions in this study), surviving for 32 months from the time of diagnosis and requiring 2.4 admissions per annum for a mean of 11 days per admission, would cost R19 712 per infant (based on a paediatric bed cost of R280 per day). In comparison, the cost of the MTCT Prevention Programme in Khayelitsha, Cape Town, was calculated at between R624 520 and R810 520 per annum, based on a rate of 5 000 births each year. The cost included serological screening for infection, treatment for an expected 10% of infected women according to the Thai regimen,[8] *Pneumocystis carinii* pneumonia (PCP) prophylaxis, follow-up serotesting at 15 months of age and formula milk feeds up to age 6 months for infants at risk. On the basis of a vertical transmission rate of 30% and an effective 50% protection rate, the cost per infant protected from infection lies between R8 326 and R10 806, which is much more cost effective than the R19 712 per infant required for care of paediatric inpatients in a specialised hospital.

Hussey *et al.*[9] examined the survival patterns of 193 children in Cape Town known to be vertically infected with HIV. The median survival of children with HIV was 32 months from time of diagnosis (median age at diagnosis was 5 months) and survival time was influenced by age and disease severity. For children over the age of 12 months, the cumulative proportion surviving 48 months was 78%. This compares poorly with survival rates in developed countries such as the USA (where an HIV-infected infant has 75% chance of surviving in excess of 5 years) and Italy (70% of perinatally infected children were alive at 6 years and 50% at 9 years). The difference in survival times can be attributed to availability and access to medical care, access to ARV therapy and other supportive care often lacking in developing countries.

A recent count at the RCH[10] revealed that toddlers with AIDS occupied 25% of the general paediatric beds. The authors questioned the logic of spending 25% of the hospital's scarce resources on treating an inevitably fatal affliction, i.e. denying access to these patients to alleviate the chronic shortage of hospital beds for children with other diseases.

The European Collaborative study[11] that reported on the hospitalisation of children born to HIV-infected women in Europe found that uninfected children had 0.5 admissions per 5 child years compared with 2.4 for infected children. It was found that infected children were 4 times more likely to be hospitalised than uninfected children of the same age. Nearly 60% of the total inpatient days of HIV-infected children occurred after AIDS diagnosis. This places a heavy

burden on the health care system and has implications for planning and admission protocols in resource-poor countries. Medscheme, the country's largest private medical scheme administrator, undertook a number of studies[12] in which they demonstrated that the hospital treatment arising from complications of AIDS-defining illnesses was more expensive than providing double or triple ARV therapy for the rest of the patient's life. Medscheme calculated that it cost R60 000 per annum (average first 2 years) to manage a patient with HIV/AIDS on double ARV therapy, R70 000 per annum for triple therapy, and R230 000 per annum on patients who were unmanaged (not receiving ARV therapy).

Studies done elsewhere in Africa[13-15] report that drug costs and consumption among paediatric HIV patients will continue to increase, resulting in shortages of essential medicines because of financial constraints, and that the impact of AIDS in the sub-Saharan region will result in less treatment available to all patients – those with AIDS and those without AIDS. The clinical spectrum of HIV disease in children is similar in most African studies where ARVs are not available to infected patients. These include respiratory infection, malnutrition, anaemia, diarrhoea, malaria, meningitis, pneumonia and TB.[16-18]

In summary, the literature shows clear evidence of an increasing burden of costs placed on institutions and governments in developing countries where paediatric inpatient care occurs in the continued absence of ARV therapy.[19] There is much evidence that MTCT programmes reduce infection rates and the provision of ARV therapy is more cost effective than treating unmanaged patients symptomatically for the wide spectrum of disease associated with paediatric HIV/AIDS. Alternatives such as home-based care for HIV/AIDS patients have been shown to reduce the medical utilisation costs of HIV/AIDS cost by between 28% and 50%, depending on which stage of the disease the patient is at.[20] These are difficult times for health planners in developing countries, and difficult decisions will have to be made regarding future inpatient admission protocols and management protocols for paediatric HIV-positive patients admitted to financially strapped tertiary hospitals for care.

AIM

To assess the cost of inpatient care for paediatric HIV-positive patients at RCH.

OBJECTIVES

- To determine the cost of inpatient care for paediatric HIV-positive patients over a 1-year period at RCH.
- To provide baseline data for health planners to develop/modify admission and management protocols for patients with paediatric HIV.
- To provide baseline data for health planners at RCH to plan for future needs in terms of budget allocation for the management of paediatric HIV-positive patients.

METHODOLOGY

The study population included all paediatric HIV-positive children admitted to RCH for inpatient care between January and December 2001. HIV positivity was confirmed by means of a laboratory test. Patients who had clinical signs and symptoms strongly associated with HIV/AIDS infection but whose serological status was unknown were excluded from the study. Similarly, patients who tested negative for HIV, were awaiting retest or had not been tested because consent had been refused, were not included in the study population. Another inclusion criterion was that admission as an inpatient must have occurred within the specified study period of January - December 2001 (Table I). A retrospective 25% random

TABLE I. TARIFF FEES AND OTHER DATA USED IN THIS STUDY

Item	Source	Additional notes
Amounts for budgets	RCH Budget for 2001/2002	Supplied by financial director for RCH
HIV+ statistics	RCH Laboratory	
Patient admission statistics	Administration office	
Medicine costs	Hospital pharmacy	Tender price list for 2001. These amounts are much lower than RAMS tariffs
X-ray costs	RAMS schedule of fees 2001	These tariffs were used after consultation with department head
Admission costs	High care/general ward R1 685.30 per day ICU R2 631.00 per day	RAMS fees for 2001
Surgical costs	RAMS schedule of fees	Same as above
Laboratory costs	BHF tariff fees for 2001	Same as above

sample of all paediatric HIV-positive inpatients was chosen for inclusion into the study.

Information describing the patient's demographic details, date and duration of admission, reason for admission, additional diagnosis, nutritional status, laboratory investigations done, surgical procedures performed and medication prescribed were obtained from patient records.

Only the direct costs attributable to patient care were recorded. The costs for occupation of a paediatric bed (admission costs – high care and intensive care), laboratory investigations, medication obtained at the hospital pharmacy, X-ray costs and costs for surgical procedures were recorded as direct costs for each patient. Tariff fees charged for these services were obtained after broad consultation with the medical superintendent, director of finances for RCH, senior nursing staff, department managers, and hospital administrators in charge of patient billings. Table I provides more detail as to how figures used in this costing exercise were obtained. Ethical approval for this survey was obtained from the Ethics Committee of RCH and Stellenbosch University.

Indirect costs such as personnel costs, physicians' fees, etc. were excluded from this cost analysis because of the inherent difficulties of estimating such costs. Data analysis was done using Microsoft Excel Data Analysis and Data Analysis Plus software packages and results are presented in the form of graphs, tables and free text. Statistical analyses (*p*-values, *t*-tests, confidence intervals, means, etc.) are fully described where applicable. The limitation of this study was that direct costs attributable to patient care was dependent on the quality and accuracy of information recorded in the patient files selected for analysis in this study.

RESULTS

Table II provides a summary of the demographics of the study population for this retrospective costing analysis.

Almost 80% of the patients (Fig. 1) were admitted to RCH with either diarrhoea and vomiting (42%) or cough, fever and/or chest problems (37%) as the main complaint. Fig. 2 shows that the majority of the patients (62.3%) had no previous admissions to RCH, but over 25% of HIV+ patients who had previous admissions were admitted two or more times as inpatients. About 5% of HIV+ patients had previously been admitted to RCH 5 or more times for in-hospital care.

On examination at RCH, 64% of the cohort were found to be below key developmental milestones for their age (failure to thrive (FTT)) while over half (54%) of the HIV+ patients were diagnosed as having pneumonia (Fig. 3).

TABLE II. PATIENT STATISTICS FOR RCH, 2001

Medical admissions	8 614
Surgical admissions	7 418
Total inpatient admissions	16 032
No. of confirmed HIV+ inpatients	616
25% random sample for analysis	*N* = 154
Percentage of HIV+ inpatients against total admissions	4%
Race	Black =141 (91.6%) Coloured = 13 (8.4%)
Gender	Male = 83 (53.2%) Female = 72 (46.8%)
Mean (average) age	21 months (1.75 years)
Median age	14 months (1.2 years)

Other common conditions that were also diagnosed among this cohort of patients included gastroenteritis (43%), oral thrush (42%), nappy rash (32%), TB (22%), and anaemia (12%).

Fig. 4 shows the nutritional status of HIV+ patients at the time of admission to RCH. A large proportion were reported to suffer from some form of malnutrition (87%) at the time of admission. Over half of the study sample (53%) were

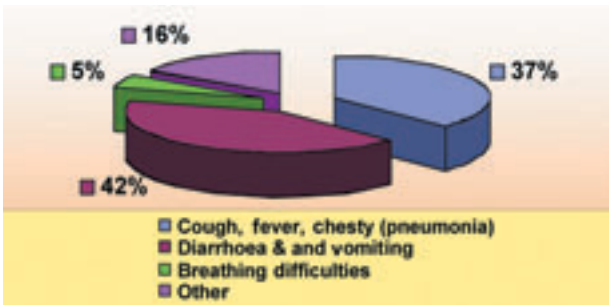

Fig. 1. Reason for admission to RCH (HIV+ paediatric patients).

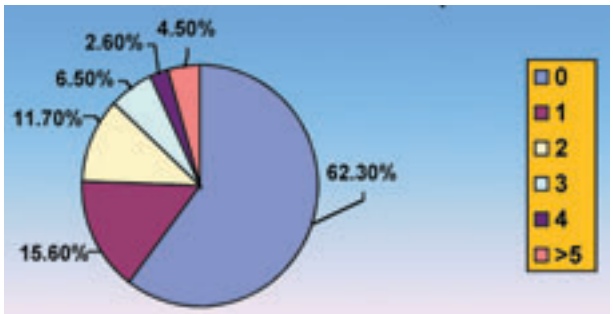

Fig. 2. Number of previous admissions to RCH.

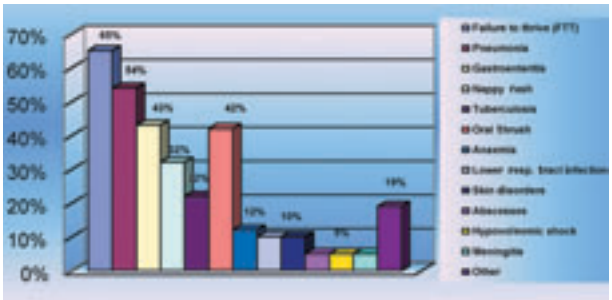

Fig. 3. Clinical diagnosis for HIV+ paediatric inpatients at RCH.

found to be underweight for their age at admission and almost 20% were found to be marasmic. In terms of in-hospital deaths, 8% of the HIV+ patients died during their stay at RCH. Although this figure seems low, it becomes significant when compared with the overall death rate at RCH for the similar period (8% v. 1.7%) – this means that HIV+ patients were 4.7 times more likely to die in hospital than their HIV-ve counterparts.

Table III provides information on the average length of stay in hospital for HIV+ patients versus all admissions to RCH. It was found that HIV+ patients stayed in hospital more than twice as long as the HIV-ve patients (9 v. 4.03 days).

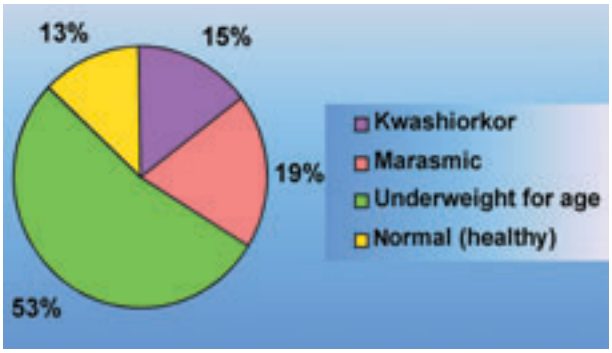

Fig. 4. Nutritional status at admission of HIV-positive patients.

TABLE III. AVERAGE LENGTH OF STAY IN HOSPITAL (DAYS) FOR HIV+ PATIENTS VERSUS ALL ADMISSIONS TO RCH

Average duration of stay in ICU	3.89
Average duration of stay (high care + ICU = total stay)	9
Average duration of stay for ALL patients	4.03

MEDICATION COSTS FOR HIV+ INPATIENTS

Table IV provides a summary of the medication costs of HIV+ inpatients at RCH. Medicines were essentially used to treat infections in these immunocompromised individuals and for prophylactic cover against further infection. Table V gives a breakdown on the average cost per patient of each of the groups of drugs costed, the budget available for that group of drugs and the percentage of budget consumed per group of drug by HIV+ patients admitted to RCH.

Fig. 5 is a graphic representation of Table IV.

Since HIV+ patients are prone to opportunistic infections, it was expected that the use of antifungal drugs among these patients would be high. However, it must be noted that these patients, who comprised only 4% of the total number of patients admitted to RCH in 2001, consumed 61% of the budget allocated for the purchase of antifungal medication. Similarly, they consumed 12%, 9% and 3% of the budgets allocated for antibiotics, analgesics and other

TABLE IV. MEDICATION COSTS FOR HIV+ INPATIENTS

Antibiotic costs	
Mean	R265.96
Total antibiotic cost for HIV 265.96 x 616	R163 831.36
Budgeted total for antibiotics (A/B)	R1 352 645
Percentage of A/B budget consumed by HIV+ patients	12%
Anti-fungal costs	
Mean cost per patient	R136.72
Total 136.72 x 616	R84 219.52
Budgeted amount for antifungals	R138 750
Percentage of budget consumed by HIV+ inpatients	61%
Analgesic costs	
Mean cost per patient	R20.63
Total spent on analgesics	R12 708.08
Budgeted expenditure	R140 787
Percentage of budget consumed by HIV+ patients	9%
Other	
Mean	R252.59
Total spent	R155 595.44
Budget (approx.)	R5 000 000
Percentage	3%
Total medication	
Mean	R591.83
Total medication	R364 567.28
Budget	7%

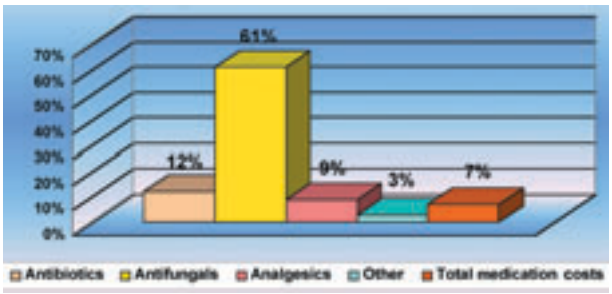

Fig. 5. Medication costs for HIV+ inpatients versus budget for medicines, 2001/2002.

medication, respectively. The total amount spent on providing medication for these patients was R364 567.28, which represented 7% of the total budget for medication in the financial year 2001/2002.

ADMISSION COSTS FOR HIV+ INPATIENTS

Table V summarises the details of the admission costs for HIV+ inpatients at RCH. The combined duration of stay (ICU + high care) was more than twice as long as that for all the other inpatients at RCH (9 days v. 4.03 days). The amount of time spent in the high-care wards differed tremendously among HIV+ patients, hence the range of 107 days for time spent in high care versus a relatively low range of 11 days for time spent in the ICU. Total admission costs amounted to approximately R9.64 million, which formed 84% of the total direct costs for HIV+ inpatients.

Approximately 12% of HIV+ patients admitted to RCH spend time in the ICU. Fig. 6 shows that 61% of these patients spend less than 1/3 of the total admission time in

TABLE V. DURATION AND COST OF STAY IN HOSPITAL (HIV+ PAEDIATRIC PATIENTS)	
Average No. of days spent in high-care wards	8.58
Median	4
Mode	2
Min.	1
Max.	108
Range	107
Average admission cost per patient in high care	R14 456.37
Average No. of days spent in ICU	3.89
Median	3
Mode	3
Min.	1
Max.	12
Range	11
Average admission cost per patient in ICU	R10 231.67
Percentage of patients admitted to ICU	11.70%
Total admission costs per HIV+ patient	R9 641 804.48
Average admission cost (high care + ICU) per HIV+ patient	R15 652.28

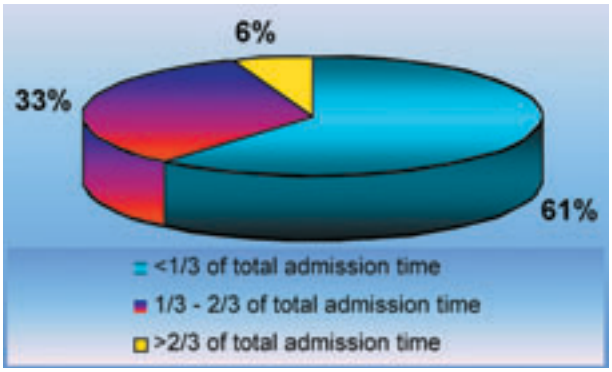

Fig. 6. Duration of stay in ICU versus total admission time.

the ICU and a relatively high percentage (33%) spend between 1/3 and 2/3 of their total admission time in the ICU. Six per cent of HIV+ patients spend more than 2/3 of their total stay at RCH in the ICU.

AVERAGE AND TOTAL DIRECT COSTS FOR HIV+ INPATIENTS

Fig. 7 provides information on the direct costs of treatment for HIV+ inpatients at RCH. The average admission cost per patient was R15 652.20, which formed 84% of the total direct costs for HIV+ inpatients at RCH. Laboratory services accounted for 9% (R1 677.42 per HIV+ patient) of the total direct costs, medication costs for 3% (R596.76 per patient), and surgical costs (R2 954.11 per patient) and X-rays (R470.00 per patient) together for the remaining 4%.

To obtain the total direct cost for all HIV+ patients admitted to RCH during 2001, the average cost per component, as shown in Fig. 5, was multiplied by 616 (N = 616). This cost is reflected in Fig. 8 below as R11.56

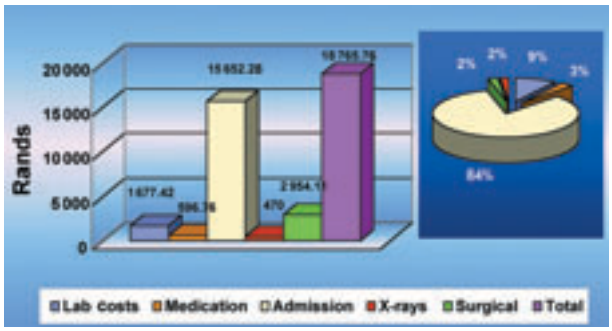

Fig. 7. Average cost per HIV+ inpatient (R).

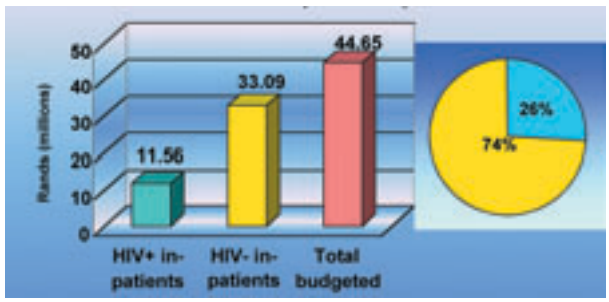

Fig. 8. Direct treatment costs for inpatients at RCH (R) (2001/2002).

million rands. The total direct cost for treating all patients at RCH (R44.5 million rands) was obtained as follows:

Budgeted item 2001/2002	Cost as per budgeted
Total budget	R152 840 000.00
Personnel expenditure	-106 318 000.00
Administration expenses	-1 291 000.00
Professional and special expenses	-5 080 000.00
Revenue	+4 500 000.00
Total direct costs	R44 651 000.00

The direct cost for HIV- patients (R33.09 million) was calculated by subtracting the total direct cost for all patients from the total direct costs for HIV+ patients (R44.65 million - R11.56 million).

Alarmingly, HIV+ patients, who formed only 4% of total admissions at RCH in 2001, consumed 26% of the total budget for direct costs for patient treatment.

DISCUSSION

The proportion of HIV+ inpatients against total patient intake for 2001 was relatively low at 4%. This low percentage is similar to prevalence figures reported by Madhi *et al.*[17] who found that 5% of children born in Soweto were HIV+. However, the 4% prevalence rate differs significantly from the findings of Leary,[21] who reported that 25% of general paediatric beds at RCH were

occupied by infants and toddlers with AIDS. This figure of 25% is misleading as it reflects the percentage for HIV+ patients in the general ward for one day only (15 of the 56 patients in the general ward). The findings of our study, which reports on prevalence of HIV+ admissions for a full year (4%), are also lower than those reported by Roux *et al.*[7] who found that 8.3% of the total beds available in the Cape Metropole Region in the second week of March 1999 were occupied by HIV+ paediatric patients (106 of the 1 264 beds). Again, the time period of this study (1 week) makes the use of this value unreliable when compared with the 4% prevalence reported in this study. Also, Roux *et al.*[7] considered patients HIV+ if they had a positive laboratory test or had suspected physical signs of HIV infection but their serological status was unknown. Our selection criteria for this study were more rigid, which could probably explain the difference in the findings between Roux *et al.* and our study. Chintu *et al.*[16] and Vetter *et al.*[18] reported prevalence rates of 28% (Lusaka, Zambia, 1991) and 8.2% (Abidjan, Ivory Coast, 1992), respectively.

Almost 80% of patients (Fig. I) were admitted to RCH with a history of diarrhoea and vomiting (42%) and pneumonia (37%). These findings are similar to those reported in other studies.[7,16,22] More than 60% (Fig. 2) of the patients admitted during 2001 were first-time admissions to the hospital. This figure is significantly higher than the 35% reported by Roux *et al.*[7] About 25% of the cohort had been admitted two or more times previously, indicating the tremendous burden that HIV+ patients can place on limited bed space at RCH, which has approximately 262 beds available for all patients. Roux *et al.*[7] also reported a mean of 2.4 v. 2.0 (our study) admissions for those who had previous admissions to hospital – however, at the time of the study patients did not have access to ARV drugs that are routinely available in most of the developed world.

The average length of stay for HIV+ patients was 9 days per patient, which is more than double the average for HIV- patients (4.03). This translates to 12% of the total bed days available at RCH (262 beds x 12 months x 30 days = 94 320 000 theoretically available – assuming that these beds are available all year round). In reality this figure of 12% will be higher as all hospitals in the Western Cape are forced to reduce the number of beds available to reduce costs and stay within their allocated budgets. Nelson *et al.*[13] reported a mean length of stay for their patient cohort of 7.9 days.

Fig. 4 provides the details on most common conditions that afflict HIV+ patients and cause them to be admitted to hospital. The percentages may vary among different studies, but most authors[7,13,16,18] report similar diagnoses in settings where ARV therapy is not available. Chan *et al.*[23] reported that 25% of their HIV+ cohort were diagnosed with TB. These findings are similar (Roux *et al.*[7] 21%, our study 22%) to studies done locally, even though Chan's cohort of patients were in a setting (Children's Medical Center, Brooklyn, New York) where ARVs were available as standard care. A key reason for the susceptibility of these children to opportunistic infections is malnutrition, which affected 87% of the patients in this study (Fig. 5). The effects of living in abject poverty, often in households with no proper sanitation or clean water, and in rural settings where access to care is limited by the ability to pay for transport, plays an important role in further complicating the ability of these patients to ward off infections. The story that is not told in this research paper is the cycle of admission to hospital of very sick patients, their 'stabilisation' in hospital by overworked staff, their early discharge (as soon as they are stabilised) back into the cycle of poverty, and then their re-entry into hospital when they are once more sick because of exposure to a hostile environment that offers little chance for their well-being. Some patients are eventually abandoned or referred to places of safety because the parents themselves are sick (or dead) and cannot care for their young. RCH also has to bear the full cost of treatment of these patients as their parents cannot afford to pay for health services. One hundred per cent of the sample randomly selected for this study were found under the 'free patient' category, which exempted them from any payment for services rendered.

The mortality rate of the cohort in this study was 8%. This figure is significant when compared with the overall death rate at RCH for the similar period (8% v. 1.7%). HIV+ patients were 4.7 times more likely to die in hospital than their HIV- counterparts. Mortality rates from studies in Ivory Coast[18] (20.8% v. 8.7%) and Zambia[16] (19% v. 9%) are similar to those of RCH. Nelson *et al.*[13] reported a mortality rate of 16% for their cohort of patients in Malawi. Hussey *et al.*[9] examined the survival patterns of children known to be vertically infected with HIV-1 in the Cape Town Metropole. The median age at diagnosis was found to be 5 months – 72% of the children were less than a year old when they were diagnosed with HIV. The median survival time of children with HIV was 32 months from the time of diagnosis. In developed countries, the median survival time was found to be in excess of 5 years (60 months),[24,25] which was more than twice that for developing countries.[9,26,27] Hussey *et al.*[9] believe that the difference in survival is clearly related to the availability and accessibility of medical and other supportive care.

The average direct cost to RCH to treat HIV+ patients was found to be R18 765.76 per admission per HIV+ patient. Eighty four per cent of this cost consisted of admission

(bed) cost alone (Fig. 7). Mkele *et al.*[28] reported in their cost analysis for HIV+ patients that bed costs comprised 82% of the total expense of inpatient care, while drugs made up only 5%, results similar to those obtained in our survey. The total amount spent on direct treatment costs for HIV+ inpatients amounted to 26% of the total direct costs for all admissions to hospital, i.e. HIV+ patients, who accounted for only 4% of total admissions to hospital, consumed 26% of the budget for direct treatment costs. It is the view of the authors that RCH is faced with tough choices if it wants to operate within its allocated yearly budget. Hospitals are being forced to operate within budgets and managers at these institutions will have to take the necessary steps (cost-cutting exercises) to make sure that they do so. This then begs the question: What are the options available to RCH in light of the ever-increasing HIV epidemic, reduced budgets, greater demand for bed space, over-worked staff and the continued inability of most patients to pay for services?

1. DEVELOP QUOTAS FOR ADMISSION OF CERTAIN CATEGORIES OF PATIENTS

To ensure that admission to RCH is available to the wider spectrum of patients, categories of patients that use up a higher amount of resources would have to be restricted. However, this is fraught with ethical dilemmas, and doctors will be forced to 'play God' with patients' lives. In addition, solutions would have to be found for those patients that the hospital refuses to admit if it has exceeded its intake quota for that category of patient.

2. DEVELOP MANAGEMENT PROTOCOLS FOR IN-HOSPITAL CARE OF HIV+ PATIENTS

There was a wide variation in terms of the direct costs assessed in this study. While a lot of this variation can be explained by the HIV+ patients admitted requiring different levels or types of care, medication, laboratory tests and surgical procedures discrepancies need to be addressed.

- Some patients were discharged as soon as they were 'stabilised', as there was pressure in the ward for bed space. Others were kept in hospital until they had fully and completely recovered.
- Some patients were discharged with 3 months' supply of medicines and multivitamins. Other patients, who appeared to need these medicines as they were discharged as soon as they were stabilised, were not given any medicines.
- Some doctors appeared to keep patients in hospital longer than others. This may be due to patient circumstances, but is probably due to a more cautious approach among certain doctors.

3. PROVISION OF ANTIRETROVIRAL THERAPY (ART) FOR HIV+ PATIENTS

The findings of this study provide strong evidence that unless something is done to reduce the transmission rates from mother to child, RCH will be faced with a greater demand for bed space from HIV+ patients who require more resources than other patients. In the USA and Brazil, highly active antiretroviral therapy (HAART) was found to reduce costs by an average of 46% and 80% for public health hospitals.[29] There is a shift of costs from hospitalisation to outpatient care. In the local context, this would imply the supply of cheaper HAART to reduce hospitalisation and number of admissions.

4. PREVENTION OF MOTHER-TO-CHILD TRANSMISSION (MTCT)

The Western Cape government has been involved in preventive MTCT programmes since 1999. Every R1 spent in the MTCT programme results in a saving of about R2.50 in hospital costs for treating an HIV-positive baby. By assuming that a single dose of nevirapine given within 72 hours after birth reduces transmission by 50%,[30] one can estimate that the proportion of HIV+ patients will be reduced by a similar figure. This translates to the number of inpatients diagnosed with HIV infection being reduced from 616 to about 308. The total direct cost for treating this group would then be around R5.77 million (R18 765.76 x 308) – a saving of R5.79 million (R18 765.76 x 308). This saving is immense when compared with the price of a single dose of nevirapine – about R10.[31] Roux *et al.*[7] calculated the lifetime cost of an HIV-infected child to be almost twice that of protecting an infant from infection through the prevention of MTCT.

5. HOME-BASED CARE INITIATIVES

The flood of HIV+ patients into tertiary hospitals (such as RCH) can be stemmed if there were more rural clinics and home-based care linked to these specialist HIV clinics.[22] Currently RCH, via its outpatient facilities, fulfils tertiary, provincial, district and primary health care functions, forcing highly trained staff often to spend too much time on patients who do not necessarily require their skills. Government needs to allocate more money for home-based care initiatives and provide more nurses and doctors in rural areas. A large majority (over 65%) of patients in this study were from rural areas. Local communities should be empowered to take charge of their own health care, and basic skills transfer and visits to these communities by trained nurses can result in much less suffering for patients and less expense for the state which bears the full cost for their care.

This study highlights the high cost of care that is required by HIV+ patients who are admitted as inpatients to RCH. RCH provides a beacon of hope for all children throughout Africa, as it provides highly specialised care that is often only available at this facility. However, it too is being affected by the HIV crisis facing the country, and is facing an untenable position of continuing to provide specialised care in an environment of lower budgets, higher demand and greater need by children, who, along with their HIV+ mothers, continue to suffer discrimination.

The managers of RCH face difficult choices requiring tough decisions that must clearly be addressed with some urgency. Decisions affecting the care of HIV-positive children must reflect choices that are sustainable, and furthermore must reflect our commitment to improving the quality of life of these children. Government must be informed that in a realistic economic sense, the pursuit of efficient practice is not merely reducing costs or budgets or avoiding costs.

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REFERENCES

1. Kustner HGV, Swanevelder JP, Van Middelkoop A. National HIV surveillance — South Africa, 1990-1992. *S Afr Med J* 1994; **84**(4): 195-200.
2. Department of Health. Ninth national HIV seroprevalence survey of women attending public ante-natal clinics in South Africa. *AIDS Scan* 1998; **4:** 5-9.
3. Department of Health. Western Cape. The Provincial and District HIV Antenatal Survey, 2001: Figure 4, p. 7.
4. Hospitals turn away the ill as funding is diverted. *Cape Argus* 2002; 12 Feb: p. 3.
5. Van der Linde I. The cost of HIV/AIDS - without a clue? *S Afr Med J* 1999; **89:** 33-34.
6. Havens PL, Cuene BE, Holtgrave DR. Lifetime cost of care for children with human immunodeficiency virus infection. *Pediatr Infect Dis J* 1997; **16:** 607-610.
7. Roux P, Henley L, Cotton M, Eley B. Burden and cost of inpatient care for HIV-positive paediatric patients - status in the Cape Town metropole during the second week of March 1999. *S Afr Med J* 2000; **90:** 1008-1011.
8. Centers for Disease Control. Administration of zidovudine during late pregnancy and delivery to prevent perinatal HIV transmission — Thailand 1996-1998. *MMWR* 1998; **47:** 151-154.
9. Hussey GD, Reijnhart RM, Sebens AM, Burgess J, Schaaf S, Potgieter S. Survival of children in Cape Town known to be vertically infected with HIV-1. *S Afr Med J* 1998; **88:** 554-558.
10. 25% of general paediatric beds occupied by infants and toddlers with AIDS - RCH Children's Hospital. *AIDS Scan* 1998; **10**(4): 13.
11. The European Collaborative Study. Hospitalisation of children born to human immunodeficiency virus-infected women in Europe. *Pediatr Infect Dis J* 1997; **16:** 1151-1156.
12. Cowlin J. Cheaper to manage HIV than to treat AIDS — the Medscheme experience. *S Afr Med J* 1999; **89:** 34-35.
13. Nelson EAS, Weikert M, Phillips JA. Paediatric treatment costs and the HIV epidemic. *Cent Afr J Med* 1995; **41**(5): 139-144.
14. Peckham CS, Tedder RS, Briggs M, *et al.* Prevalence of maternal HIV-1 infection based on unlikely anonymous testing of newborn babies. *Lancet* 1990; **335:** 516-519.
15. Jensen BA. *The Financial Costs of Treating AIDS in Zimbabwe.* Zimbabwe Essential Drugs Action Programme (ZEDAP), 1990.
16. Chintu C, Luo C, Bhat G, *et al.* Impact of the human immunodeficiency virus type-1 on common paediatric illnesses in Zambia. *J Trop Paediatr* 1995; **41:** 348-353.
17. Madhi SA, Schoub B, Simmank K, Blackburn N, Klugman KP. Increased burden of respiratory viral associated severe lower respiratory tract infections in children infected with human immunodeficiency virus type-1. *J Pediatr* 2000; **137:** 78-84.
18. Vetter KM, Djomand G, Zadi F, *et al.* Clinical spectrum of human immunodeficiency virus disease in children in a West African city. *Pediatr Infect Dis J* 1996; **15:** 438-442.
19. Health Minister sticks to her guns. *Cape Argus* 2002; 13 Feb: p. 2.
20. Halic B. Affordability of home-based care for HIV/AIDS. *S Afr Med J* 2000; **90:** 690-691.
21. Leary PM. Pestilence in our time. *Pedmed* 1998; July/August: 2.
22. Bateman C. Can KwaZulu-Natal hospitals cope with the HIV/AIDS human tide? *S Afr Med J* 2001; **91:** 364-368.
23. Chan SP, Birnbaum J, Rao M, Steiner P. Clinical manifestations and outcome of tuberculosis in children with acquired immunodeficiency syndrome. *Pediatr Infect Dis J* 1996; **15:** 443-447.
24. Tovo PA, De Martino M, Gabiano C, *et al.* Prognostic factors and survival in children with perinatal HIV-1 infection. *Lancet* 1992; **339:** 1249-1253.
25. Barnhart HX, Caldwell MB, Thomas P, *et al.* Natural history of human immunodeficiency virus-1 infection. Pediatrics 1994; **94:** 815-819.
26. Scott GB, Hutto C, Makuch RW, *et al.* Survival in children with perinatally acquired human immunodeficiency virus type 1 infection. *N Engl J Med* 1989; **321:** 1791-1796.
27. Turner BJ, Denison M, Eppes SC, Houchens R, Fanning T, Markson LE. Survival experience of 789 children with the acquired immune deficiency syndrome. *Pediatr Infect Dis J* 1993; **12:** 310-320.
28. Mkele G, Summers RS, Bannenberg WJ. Economic implications of drug treatment for HIV/AIDS and related opportunistic infections in South Africa. *Southern African Journal of Epidemiology and Infection* 1999; **14** (1): 16-21.
29. Cullinan K. HIV plan saves lives and cash. *Sunday Times* 2002; 30 June (**http://www.suntimes.co.za/2002/06/30/news/news13.asp**).
30. Nevirapine (Viramune) information page. **http://www.projinf.org/fs/nevirap.html** (accessed 3 November 2004).
31. Anstey G. Officials may challenge Aids ruling. *Sunday Times* 2001; 16 December (**http://www.suntimes.co.za/2001/12/16/politics/po101.asp**).