Cost of a dedicated ART clinic

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Background. The provision of antiretroviral therapy (ART) is being rolled out across South Africa. Little evidence exists on the cost of running clinics for ART provision.

Objectives. To determine the cost per patient-month enrolled in an ART programme and per patient-visit for a dedicated, public-sector ART clinic in a South African peri-urban setting in 2004/05 and 2005/06, as the clinic moved from a temporary to a permanent site.

Methods. A retrospective costing study was performed from a programme perspective. Two years of expenditure data for the clinic were collected from primary sources. Costs per patient visit and per patient-month were calculated in Rand and converted to 2004 US$ (R6.4347 = US$1).

Results. The total cost of running the site, excluding patient-specific items (medicines and medical tests), was $174 072 in 2004/05 and $421 872 in 2005/06. Cost per patient-month fell from $40.29 to $36.47, a 9% decrease; cost per patient-visit fell from $54.79 to $41.62, a 24% decrease. In 2005/06, 68% of all expenditure was on medical and pharmacy staff (versus 62% in 2004/05), 23% was on the employment of peer adherence counsellors (versus 35%), and the remaining 9% was on capital costs and supplies (versus 3%).

Conclusions. The increase in scale of operation for the provision of ART at this clinic allowed economies of scale to be reaped. Staff costs, both medical and support, comprised the large majority of total clinic costs, such that the erection of a dedicated building for the clinic had little impact on the economic cost of care.

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Although the provision of antiretroviral therapy (ART) through the South African public health care sector has expanded rapidly since its inception in 2003, it has been estimated that less than one-quarter of those in need of antiretrovirals (ARVs) were on treatment by the end of 2005.[1] Furthermore, the numbers of people requiring ART will continue to rise for the foreseeable future, as those currently too well to need ART join those continuing in the programme.

The South African government is committed to providing ARVs to all who need them.[2] Given the size of the epidemic, and the limited resources available for public health care, it is crucial that the most efficient models of ART provision are utilised in order to achieve this goal. Unfortunately, there is little existing information on the cost and cost-effectiveness of different models of ART care. This is particularly true of those primary and community care-based models most relevant to lower- and middle-income countries with generalised epidemics.[3-5] Early cost analyses of ART provision, conducted in North America and Europe, focused largely on the cost of hospital, rather than clinic-based, care.[6] However, one recent study[7] of Swiss clinics compared hospital-based with general practice-based ART provision. The authors found that although hospital-based care was more expensive, this was almost entirely because of differences in ARV prescribing patterns and that non-medication costs did not differ significantly between the study arms.

Two costing studies of middle-income countries that do not have generalised epidemics have been performed, viz. in Thailand, looking at hospital-based clinics,[8] and in Mexico.[9] The latter study covered 11 major clinics nationwide, but the analysis abstracted away the variation due to differences in site of care provision via clinic fixed-effects. This made any consideration of cost differentials due to different models of care impossible.

Almost nothing is currently known about the overall cost of providing ARV services through the public health care sector in Africa. A study from KwaZulu-Natal found that running a voluntary counselling and testing (VCT) clinic cost between $161 and $53 per client in 2002/03, falling as the number of clients seen rose.[10] The only existing cost study of ART provision in South Africa of which the authors are aware, found that a dedicated, primary care ART clinic in Khayelitsha in the Western Cape cost R145.15 ($22.56) per visit in 2002/03, excluding patient-specific items such as medicines and laboratory tests.[11]

A more recent, predominantly qualitative, comparison of different models of ART care provision in the Western Cape[12] noted the significant variations in staff costs across clinics depending on whether they operated at hospitals or primary health care facilities, and on the mix of clinical staff.

This study aimed to provide information on the operating costs of a doctor- and adherence counsellor-intensive clinic based in the Western Cape. The objectives of the analysis were first to measure the cost components of a dedicated ART clinic

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in South Africa, and second to determine how the importance of these components varied as the clinic grew in size. It is hoped that this will contribute to a fuller understanding of the likely evolution of the cost of providing ART as the national treatment programme expands.

Methods

Site description

The site studied, the Hannan Crusaid Treatment Centre (HCTC), is a dedicated ART clinic based at the Gugulethu Day Hospital in Nyanga, a peri-urban settlement close to Cape Town. Operating since September 2002 it was initially a joint project between the Desmond Tutu HIV Centre (DTHC), which is a not-for-profit HIV research organisation; the UK-based charity Crusaid; and the provincial government of the Western Cape (PGWC). It has subsequently been fully integrated into the provincial ART roll-out programme. The HCTC acts as the primary care provider to all individuals enrolled at the centre, providing ART and non-ART-related care. The work of the HCTC has been described previously.[13]

This study was conducted retrospectively covering the 2 financial years 2004/05 and 2005/06, from March 2004 to February 2006. At the beginning of the observation period the clinic was run from a temporary structure with 70 m^2 of floor space, in the grounds of the Gugulethu Day Hospital. In March 2005 the clinic relocated to a purpose-built clinic, 369 m^2 in size, on the same site. A wide range of medical and non-medical equipment was purchased for this new clinic.

All medical staff are employed by the PGWC. In March 2004 the staff consisted of 1 principal medical officer (PMO) and 1 professional nurse (PN). Two years later this had expanded to include 3 PMOs, 2 senior medical officers, 2 PNs, a staff nurse, a principal pharmacist and 2 assistant pharmacists. A unit manager was also employed during some of the period in question.

The Sizophila adherence counsellor programme is a peer-counselling project that has been an integral part of the HCTC ART programme since its inception. Counsellors are employed from the local community and are all openly living with HIV. Each counsellor is responsible for up to 50 patients, providing pre-treatment counselling, group education on living on ART, home visits to monitor adherence and ongoing treatment support. This support is intensified if ART adherence declines. The project is co-ordinated by a nurse employed by the DTHC and during the period of study utilised a cellphone-based reporting system for relaying messages and reporting ART pill counts from home visits.

Data collection and analysis

The cost analysis was performed retrospectively from a programme perspective. The cost of the buildings and their contents were sourced from receipts for the relevant items provided by the DTHC and PGWC. Costs were apportioned across all years of useful lifetime: the temporary building was assumed to have a lifetime of 10 years, the purpose-built building 30, the fixtures and fittings 5, and electronic equipment 3. All costs were discounted at 3%, in line with international standards.[14]

The monthly cost of employing medical staff was taken from PGWC wage rates in February 2006. The costing of the Sizophila was complicated by the programme being managed from the DTHC by the nurse co-ordinator. The cost of running her office at the DTHC was included in proportion to her time spent on Sizophila. The cost of developing, implementing and running the cellphone-based reporting system was also included.

The quantity of medical supplies, such as needles, gloves and thermometers, and of cleaning products used in 2005/06 by the centre, was estimated by the nurse in charge of ordering such items. The cost of these items was calculated from the PGWC medical depot catalogue. A cost per visit for those supplies was calculated and that cost attributed to 2004/05 visits.

Stationery for patient records was provided by the DTHC. This cost was calculated from receipts for all items except paper forms, for which costs were based on the number of sheets of paper used per visit multiplied by the cost of the paper and of photocopying.

All costs were standardised to average 2004 prices using South Africa's consumer price index.[15] Costs were then converted into US dollars using the average exchange rate for 2004 at the rate of US$1 to R6.4347.[16] Total costs were calculated by summing all categories. The total number of visits for each financial year, both scheduled and unscheduled, was taken from clinic records. The total number of patient-months was calculated by measuring the number of days each patient who enrolled at the HCTC before 1 March 2006 spent in the programme in each financial year, and dividing the total by 28.

Results

The total cost of running the HCTC rose by 142% from $174 072 in 2004/05 to $421 872 in 2005/06 (Table I). The total number of patient visits made in the 2005/06 financial year was 10 137, an increase of 219% over 2004/05, although the total number of patient-months on treatment rose by only 167%, from 4 321 to 11 569.

The move from a temporary structure to a purpose-built building meant that the annual economic cost of the centre's building and equipment rose more than eightfold from $3 075 to $29 221, far faster than the rate of increase in patient numbers. However, even in 2005/06 physical assets accounted for only 6.2% of total costs.

Table I. Cost components at the Hannan Crusaid Treatment Centre (2004 US$)

	2004/05	2005/06
Physical assets		
Building	2 636	22 993
Fixtures and fittings	439	2 991
Electronic hardware	-	3 236
Medical staff		
Doctors' salaries	82 427	178 540
Nurses' salaries	22 903	41 196
Pharmacists' salaries	2 489	50 423
Office manager's salary	-	17 670
Sizophila Counselling Programme		
Management and administration	15 152	15 788
Counsellor salaries	36 447	72 102
Cellphone-based reporting system	9 115	9 412
Supplies and overheads		
Medical supplies	1 086	3 466
Stationery	998	2 763
Overheads	381	1 484
Total cost*	174 072	421 872
Number of patient-visits	3 177	10 137
Cost per visit	54.79	41.62
Number of patient-months on treatment	4 321	1 569
Cost per patient-month on treatment	40.29	36.47

*Figures do not sum precisely because of rounding.

In contrast, the cost of the counselling programme rose more slowly than patient growth, increasing by 60% between the 2 years. As a result, the proportion of clinic costs due to this programme fell from 34.9% in 2004/05 to 23.0% in 2005/06.

The largest cost component at the clinic was that of clinical and managerial staff, which rose from $287 829 to $693 785 over the period of observation. This accounted for 61.9% of all costs in 2004/05, rising to 68.2% in 2005/06. More than three-fifths (62.0%) of this cost in the more recent year was due to doctors' salaries, with the remainder being split between nurses (14.3%), pharmacists (17.5%) and a unit manager (6.1%).

The cost per patient visit fell by 24.0% between the 2 years of observation, from $54.79 to $41.62 (Fig. 1). Although the proportion of costs attributable to physical assets rose, it had little impact on the overall cost per patient-month. More noticeable was the fall in the proportion attributable to the adherence counsellor programme. The cost per patient-month changed little between 2004/05 and 2005/06, falling from $40.29 to $36.47 (Fig. 2).

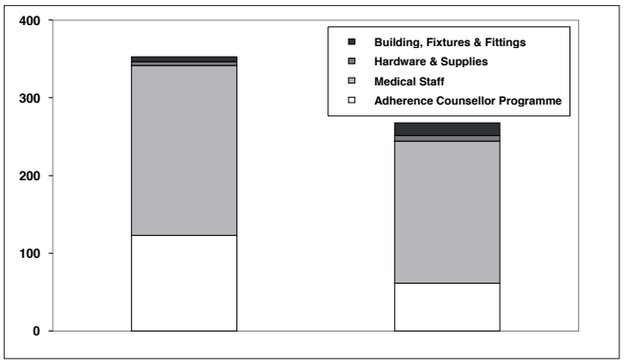

Fig. 1. Cost per patient visit (US$) at the Hannan Crusaid Treatment Centre.

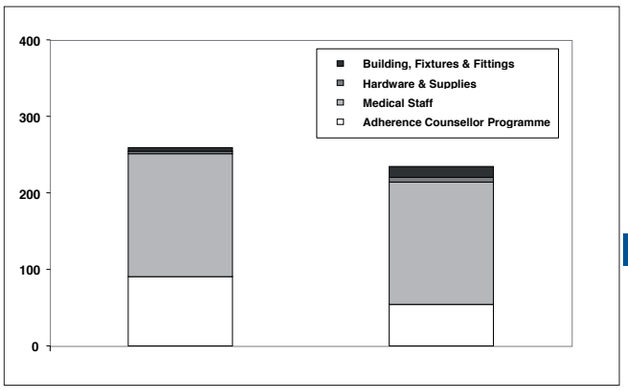

Fig. 2. Cost per patient-month (US$) at the Hannan Crusaid Treatment Centre.

Discussion

The reduction in cost per patient visit seen at this clinic over the period of observation, as services were rapidly scaled-up, suggests that there are significant potential returns to clinic scale in the provision of ARVs. Evidence that the clinic's clinical outcomes were not affected by this scale-up,[13] suggests that the reduction in cost per patient seen is not due to a reduced standard of care. The smaller reduction in cost per

patient-month can be attributed to the rise in the proportion of patients who were newly enrolled at the clinic, since clinic visits are more frequent in the first 6 months of care than thereafter.

The cost of running the HCTC was largely driven by staff salaries. This is in line with evidence from other South African studies that medical staff costs make up the majority of non-patient-specific expenditures at ARV clinics.[11] Unlike most other ARV clinics in South Africa, the HCTC is a heavily doctor-based programme,[12] which has the effect of raising the overall cost per visit well above that seen at another peri-urban clinic in the Western Cape.[11] The expansion in spending on staff salaries at the HCTC in this study period was proportional to the expansion in patient-months on treatment, but was slower than the rise in visits made, suggesting that some slight economies of scale may be achievable for medical staff.

An unusual aspect of the HCTC programme is the heavy use made of community-based adherence counsellors. The number of counsellors, even on a per-patient basis, is far higher than in comparable clinics across the Western Cape.[12] In March 2004 the counselling programme had been growing rapidly since its inception 18 months previously. It continued to expand, at a reduced rate, throughout the period of study.

Economies of scale in respect of training and administration were seen as the programme grew. This suggests that an intensive counselling intervention, such as the Sizophila model, is likely to be most efficient in large clinics, or when administration is shared between multiple sites.

The limitations of this study arise largely from the limited scope of enquiry made. No attempt was made to consider the effect of scale on demand for patient-specific items at the clinic, although it is likely that they remained approximately level on a per-visit basis. More importantly, no attempt was made to quantify what change, if any, was seen in the cost of care at other levels of care within the health care system; lower expenditure on primary care might have led to more secondary or tertiary care visits.

The HCTC ARV programme is a human resource-intensive one, employing more doctors and more counsellors per patient than other models of ARV care.[12] Nevertheless, significant economies of scale were reaped from expanding the programme between 2004 and 2006, particularly from the adherence counsellor component, without affecting clinical performance. Increased clinic scale appears to offer cost benefits in the South African ART roll-out.

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The authors declare no competing interests.

References

1. United Nations AIDS Organisation. *2006 Report on the Global AIDS Epidemic*. Geneva: UNAIDS, 2006.
2. National Department of Health. *Republic of South Africa: Progress Report on Declaration of Commitment on HIV and AIDS 2005*. Pretoria: DOH, 2005.
3. Gilks CF, Crowley S, Ekpin R, *et al*. The WHO public-health approach to antiretroviral treatment against HIV in resource-limited settings. *Lancet* 2006; 368: 505-510.
4. Stringer JS, Zulu I, Levy J, *et al*. Rapid scale-up of antiretroviral therapy at primary care sites in Zambia: Feasibility and early outcomes. *JAMA* 2006; 296(7):782-793.
5. Van Damme W, Kober K, Laga M. The real challenges for scaling up ART in sub-Saharan Africa. *AIDS* 2006; 20: 653-656.
6. Beck EJ, Miners AH, Tolley K. The cost of HIV treatment and care: A global review. *Pharmacoeconomics* 2001; 19(1): 13-39.
7. Lowy A, Page J, Jaccard R. Costs of treatment of Swiss patients with HIV on antiretroviral therapy in hospital-based and general practice-based care: A prospective cohort study. *AIDS Care* 2005; 17(6): 698-710.
8. Kitajima T, Kobayashi Y, Chaipah, Sato H, Chadbunchachai W, Thuennadee R. Costs of medical services for patients with HIV/AIDS in Khon Kaen, Thailand. *AIDS* 2003; 17: 2375-2381.
9. Aracena B, Gutiérrez JP, Bertozzi SM, Gertler P. Cost of AIDS care in Mexico: What are its main individual predictors? *Arch Med Research* 2005; 36: 560-566.
10. McConnel CE, Stanley N, du Plessis J-A, *et al*. The cost of a rapid-test VCT clinic in South Africa. *S Afr Med J* 2005; 95: 968-971.
11. Cleary S, Okorafor O, Chita W, Boulle A, Jikwana S. Financing antiretroviral treatment and primary health care services. In: Ijumba P, Barron P, eds. *South African Health Review 2005*. Durban: Health Systems Trust, 2005.
12. Pienaar D, Myer L, Cleary S, *et al*. *Models of care for Antiretroviral Service Delivery*. Cape Town: University of Cape Town Press, 2006.
13. Bekker LG, Myer L, Orrell C, Lawn S, Wood R. Rapid scale-up of a community-based HIV treatment service: programme performance over 3 consecutive years in Guguletu, South Africa. *S Afr Med J* 2006; 96(4): 315-320.
14. Gold MR, Siegel JE, Russell LB, Weinstein MC, eds. *Cost-effectiveness in Health and Medicine*. New York: Oxford University Press, 1996.
15. Statistics South Africa. *CPIX History: Metropolitan and Other Urban Areas*. 2006. http://www.statssa.gov.za/keyindicators/CPI/CPIX.pdf. (Last accessed 10 October 2006).
16. Bank of Canada: Financial Markets Department. Available from: http://www.bankofcanada.ca/pdf/nraa04.pdf (Last accessed 10 October 2006). *Year Average of Exchange Rates 2004*.

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