Models of care for antiretroviral service delivery in three provinces: Western Cape, Free State and Gauteng

June 2008

Infectious Diseases Epidemiology Unit, University of Cape Town
Centre for Health Systems Research and Development, University of Free State
Centre for Health Policy, University of Witwatersrand

Models of care for antiretroviral service delivery in three provinces: Western Cape, Free State and Gauteng

Authorship (First author then in alphabetical order):
Helen Schneider , Andrew Boulle, David Coetzee, Michelle Engelbrecht, Jane Goudge, Ega Janse van Rensburg-Bonthuyzen, David Pienaar

Acknowledgements

Preface

In 2005, the Western Cape Provincial Government requested the Infectious Diseases Epidemiology Unit of the University of Cape Town to conduct a review of approaches to antiretroviral service delivery in the province. The management systems and outcomes of five well-established sites in and around Cape Town were evaluated between May and October 2005. In 2006, the study was extended to three sites along the Southern Cape coast and to four sites in the Free State (in collaboration with the Centre for Health Systems Research and Development, Free State University). In a separate process, but based on similar methodologies, the Centre for Health Policy at Wits University reviewed the performance and capacity of four "Comprehensive, Care, Management and Treatment" (CCMT) sites in Gauteng Province. This report brings together the findings of these various studies, compiled from data presented in the following individual reports:

1   Pienaar D, Myer L, Cleary S, Coetzee D, Michaels D, Cloete K, Schneider H, Boulle A. Models of Care for Antiretroviral Service Delivery. Cape Town: University of Cape Town, 2006.

2   Pienaar D, McLoughlin JA, Coetzee D. Report on voluntary counselling and testing and ART services at three sites in the Eden District, March 2007. Cape Town: University of Cape Town & Department of Health, Provincial Government of the Western Cape, 2007.

3   M Engelbrecht, E Janse van Rensburg-Bonthuyzen, S du Plooy, M Wilke, F Steyn, K Meyer, HCJ van Rensburg, N Jacobs, M Pappin & A Pienaar. Models of care for antiretroviral service delivery (Free State). Bloemfontein: Centre for Health Systems Research & Development, 2008.

4   Schneider H, Naidoo N, Ngoma B, Goudge J, Williams E, Pursell E, Nyatela H, Lubwama J. Performance and capacity of second generation Comprehensive Care Management and Treatment (CCMT) sites in Gauteng Province. Johannesburg: Centre for Health Policy, 2008.

This combined report presents an early and in-depth assessment of emerging approaches to HIV care and antiretroviral delivery in 16 sites/settings and their implications for access and quality of care. The findings cover three provinces and a variety of facility types, systems, service designs and provider roles, predominantly but not exclusively, in the public health system of South Africa. We refer to these features collectively as the "Models of antiretroviral service delivery". We hope that the contents of this report add to the growing body of evaluations providing insights into what has become a major public health programme in South Africa, as well as some of the likely future challenges facing universal access to ART.

Individual reports are available at the following websites:
IDEU: http://www.ideu.uct.ac.za
CHSR&D: http://www.uovs.ac.za/faculties/content.php?id=113&FCode=01&DCode=161
CHP: http://web.wits.ac.za/Academic/Centres/CHP/

Table of contents

List of tables

List of figures

1   Background

Although knowledge on the outcomes of the Comprehensive Care, Management and Treatment (CCMT) Programme in South Africa remains limited on a national scale, there are a growing number of reports on outcomes at facility, district and even provincial level (see for example: Coetzee et al 2004, Bekker et al 2006, RHRU Bedelu et al 2008, Western Cape Department of Health 2006, Fairall et al 2008). These reports suggest, that in the main, the public health system in South Africa has successfully adapted to the complex demands of chronic disease care required for anti-retroviral access, at least in the early phases of the programme. However, little is known on *how* services are being organised and managed at facility level to meet these demands. For example: What sorts of treatment preparation, initiation and follow-up routines are being implemented? With what decision support tools and processes? How are roles allocated amongst the various providers? How is the management of adherence being approached? To what extent are these systems locally developed within facilities or mandated by higher levels of the health service?

Despite the detailed planning and norms provided by the Comprehensive Plan, the national standards for facility accreditation and guidelines for clinical management, there remains considerable space for (and therefore variation in) provincial and local interpretation/adaptation of guidelines and decision-making concerning the day-to-day delivery of HIV and ART services. The impact of these 'micro' level decisions is not insignificant. They can influence ease of patient access (Jacobs et al 2008, Fairall et al 2008), efficiency of services (van Damme et al 2007) and affordability. Moreover, provision of ART services is occurring in a context of both rapidly growing need and scarcity of resources (especially human), requiring an almost constant process of adaptation. Approaches to service delivery and implementation will also affect the ability to respond and innovate in the face of new challenges.

This report describes the models of service delivery in sixteen facilities providing anti-retroviral treatment across South Africa and the possible impact of different models on access and quality of care.

Specifically, the report examines the following in the study sites:

1   Models of care: staffing levels and the roles of various providers in the continuum of HIV care; patient pathways of care and associated decision support tools; adherence management systems; and degree of integration of ART with other services.
2   Patient access to sites.
3   Quality of care and outcomes.
4   Similarities and differences in models, access, quality and outcomes between sites and provinces.

2 Methods

Eight (half) of the sites studied were in the Western Cape, four in the Free State and four in Gauteng Province. The models evaluated cover three provincial – and therefore governance - realities and 10 districts (see Figure 1 and Table 1 below). Several sites have benefited from the support of non-governmental organisations or academic institutions, while others are managed through the routine public sector environment. The districts in which the sites are based have varying levels of HIV prevalence (from 11.4% to 35% ANC prevalence in 2006), and contain a mix of settlements from dense urban and peri-urban, to small town and rural areas.

The sites studied were all purposefully chosen to reflect the different realities and models of ART provision.[1] In the Western Cape they included primary health care and hospital, single purpose and integrated, and first line and referral ART sites. In the Free State, the so-called "assessment" (PHC-based CD4 screening and ART maintenance), "treatment" (initiation and referral) and "combined" (all functions) sites and one comprehensive faith-based service (provided by the Catholic Relief Service) were selected. In Gauteng, two community health centre and two hospital based sites representative of the public sector roll-out (as opposed to NGO or academic) environment were sampled. The sites assessed thus cover the full range of health care facilities in the South African health system, from basic primary health care (PHC) facilities to community health centres (CHC) and district, specialist TB and referral hospitals. This is reflected in the level of skill available in the site, which ranged from professional nurse (with medical support) to specialist physicians. In the majority (12) of sites, non-specialist medical officers were the most qualified personnel.
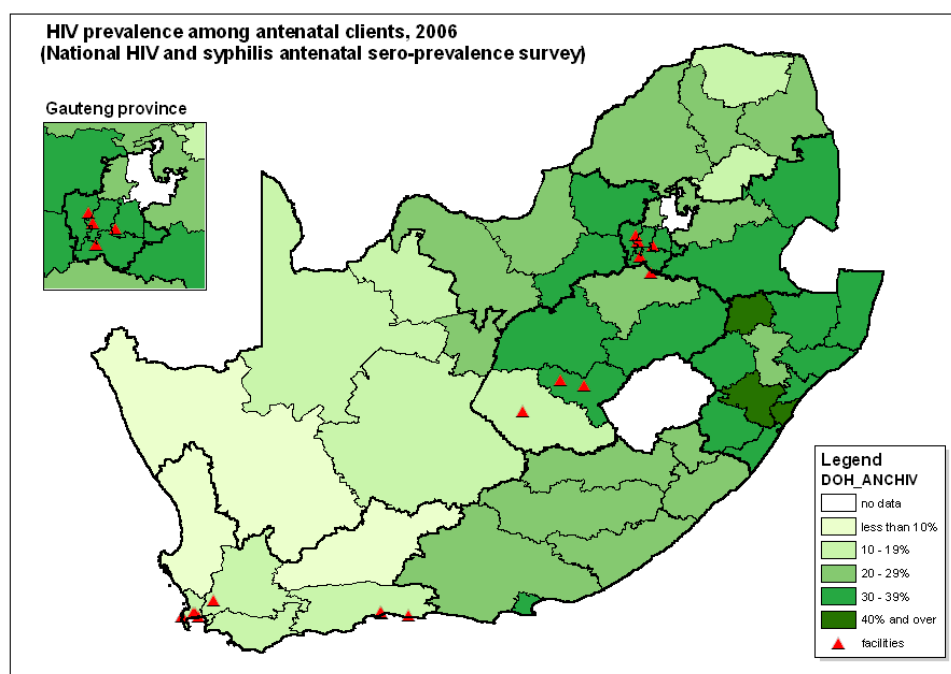
Figure 1: Distribution of study sites (represented by red triangles) against backdrop of antenatal HIV prevalence by district

---

[1] The names of the facilities are listed in Table 1, with the exception of Gauteng (initials provided only) where the study was approved based on the anonymity of study facilities.

Data collection involved key informant interviews with 75 facility personnel, completion of checklists, extraction of routine data, record reviews, focus group discussions, self administered staff questionnaires and community health worker diaries (to record time usage). In all but one facility (no 7, Thembalethu) exit interviews were conducted with adult patients attending the services, with a total of 2,127 (mean per site 142, range 62-207) respondents. Patients were recruited consecutively at facilities until target sample sizes had been achieved or when a fixed period of time had elapsed. The patient surveys included a standard household asset inventory (on the basis of which an asset index was calculated as a proxy for socio-economic status), and questions related to accessibility of services, use of various forms of treatment support, service preferences and perceptions of quality.

Data collection occurred in four separate studies in the following periods:
Western Cape 1 (sites 1-5)   May to October 2005
Western Cape 2 (sites 6-8)   November 2006 to February 2007
Free State (sites 9-12)   September 2006 to January 2007
Gauteng (sites 13-16)   May to October 2006

The data were analysed by the teams conducting the four separate studies using standard statistical packages (STATA and SPSS) and manual collation of semi-quantitative and qualitative facility information. The patient exit interview datasets were also subsequently pooled so that analyses could be conducted on common variables.

All the studies were reviewed and approved by the ethics committee of at least one of the associated universities, and by the relevant provincial authorities.

Table 1: Profile of and data collection in 16 ART sites

Facility No	Name	District (+/-locality)	Facility type	Most qualified personnel	ANC HIV prevalence*	Patient interviews	KI** interviews	Other
Western Cape								
1	GF Jooste	Cape Town Metro	Regional Hospital (referral)	Physician Specialist	17.7	133	6	Pharmacist FGD***
2	Gugulethu	Cape Town Metro	Free standing referral centre	Medical Officer	29.1	183	5	CHW diaries^ + FGD
3	Hout Bay	Cape Town Metro	PHC clinic	Medical Officer	12.4	110	4	CHW diaries
4	Michael Mapongwana	Cape Town Metro (Khayelitsha)	Community Health Centre	Medical Officer	32.6	207	6	CHW diaries
5	TC Newman	Winelands (Paarl)	Regional Hospital	Medical Officer	11.4	116	6	
6	Harry Comay	Eden (George)	TB Hospital	Medical Officer (Paediatrician support)	13.8	110	5	Record reviews (n=55)
7	Thembalethu	Eden (George)	Community Health Centre	Medical Officer	13.8	Not done	3	
8	Knysna	Eden (Knysna)	District hospital	Medical Officer	21.1	194	3	Record reviews (n=65)
Free State								
9	National Hospital	Motheo (Bloemfontein)	District Hospital ("treatment")	Family Medicine Specialist	30.5	130	6	CHW FGD; record reviews (n=90)
10	Refengkgotso	Fezile Dabi (Denysville)	PHC clinic ("assessment")	Professional nurse	29.5	79	2	CHW diaries + FGD; record reviews (n=55)
11	Itumeleng	Xhariep (Jagersfontein)	Community Health Centre ("combined")	Medical Officer	19.7	62	5	CHW FGD; record reviews (n=55)
12	Siyathokoza	Motheo (Botshabelo)	PHC Clinic (faith-based NGO)	Professional nurse (Medical Officer Support)	30.5	90	3	CHW diaries + FGD; record reviews (n=55)
Gauteng								
13	NH	Ekurhuleni Metro	Regional Hospital	Medical Officer	32.2	191	5	Provider SAQ^^ (n=11); record reviews (n=191)
14	CH	West Rand	District Hospital	Medical Officer	34.6	164	6	Provider SAQ (n=21); record reviews (n=164)
15	SC	Jhb Metro (Soweto)	Community Health Centre	Medical Officer	30.6	194	5	Provider SAQ (n=14); record reviews (n=194)
16	EC	Sedibeng	Community Health Centre	Medical Officer	35.0	164	5	Provider SAQ (n=24); record reviews (n=164)

* ANC=antenatal, 2006 figures **KI=fey informant ***FGD= focus group discussion ^CHW=community health workers ^^SAQ=self administered questionnaire

3   ART service provision

At the time of evaluation, the average duration since inception of the ART service was 26 months (range 14-49 months) (Table 2). The sites were following up a mean of 535 (range 91-2,307) patients, and initiating a mean of 34 (range 5-84) new patients on treatment each month. The site with the largest patient load (National Hospital in the Free State) was not typical in that it functioned as an initiation site that provided periodic medical review and referred patients to local clinics for follow-up once they were stable.

Table 2: Duration since inception and patients on treatment in the 16 study sites

Facility No	Name	First started providing ART	Time (in months) since inception^	Total initiated onto ART at site	Initiated onto ART in one month	On ART at the site
Western Cape			^^	As at Jul '05*	In Jul '05*	As at July '05*
1	GF Jooste	Early 2003	30	425	17	369
2	Gugulethu	Sep 2002	36	911	61	864
3	Hout Bay	Jan 2004	18	218	14	211
4	Michael M	May 2001	49	922	52	835
5	TC Newman	Feb 2004	16	451	37	416
				At Nov 2006	In Nov '06	As at Nov '06
6	Harry Comay	Jan 2004	36	550	37	399
7	Thembalethu	Nov 2005	14	127	36	97
8	Knysna	Sep 2004	26	463	29	363
Free State				Sep '06-Jan '07**		
9	National	Jun 2004	29	Not available	63	2307
10	Refengkgotso	Jan 2005	22		6	185
11	Itumeleng	Sep 2004	26		9	91
12	Siyathokoza	Jan 2005	22		5	128
Gauteng				May-Sep '06**	In Jul '06*	May-Sep '06**
13	NH	Jul 2004	25	2038	84	@1365
14	CH	Oct 2004	21	540	27	377
15	SC	Oct 2004	21	1001	30	804
16	EC	Oct 2004	21	804	41	581

^at evaluation ^^mid-point of evaluation period *official provincial data **data obtained from individual sites @ estimate based on loss to follow-up in the other provincial sites

4   Patient profiles

The median age of adult patients attending services was in the 30-40 year range in all sites. Women outnumbered men, making up 64% to 81% of patients (Table 3). There was considerable variation in employment rate between sites from a low of 6% in two Free State facilities to a high of 38% at Knysna in the Southern Cape. Educational levels tended to be lower in the Free State than the other two provinces. A third to three-quarters of patients interviewed were receiving disability grants. Apart from Itumeleng, serving a rural, farming community in the Free State, a significant proportion (21-74%) of patients lived in informal (shack) dwellings. In the Western Cape sites a high proportion of patients reported being born outside of the province, suggesting a mobile/migratory population.

Table 3: Profiles of adult patients interviewed at 16 sites

Facility No	Name	n	Median age	Female (%)	Employed last 2 weeks (%)	Median highest grade schooling	On disability grant (%)	Lives in informal dwelling (%)	Born outside the province (%)
Western Cape									
1	GF Jooste	133	34	72	24	10	48	38	68
2	Gugulethu	183	34	75	14	10	34	46	60
3	Hout Bay	110	33	73	24	9	61	74	86
4	Michael M	207	32	81	35	10	56	59	86
5	TC Newman	116	34	80	14	10	36	36	59
6	Harry Comay	110	35	64	25	9	53	31	58
8	Knysna	194	35	78	38	9	54	63	73
Free State									
9	National	130	39	72	14	8	43	22	9
10	Refengkgotso	79	37	65	6	8	58	30	15
11	Itumeleng	62	34	81	6	8	67	8	6
12	Siyathokoza	90	39	79	9	8	63	31	1
Gauteng									
13	NH	191	36	72	20	10	48	26	n/a
14	CH	164	38	72	12	8	78	32	n/a
15	SC	194	37	72	19	11	37	21	n/a
16	EC	164	37	73	16	9	43	26	n/a

n/a = data not collected (available)

5 Models of care

5.1 Human resources

5.1.1 Staff teams and levels of staffing

In 2003, the Comprehensive Plan proposed staffing norms per 500 patients on ART as follows: 1 doctor, 2 professional nurses, 1 pharmacist, 1 dietician, a half-time social worker, 2 data capturers and 5 lay counsellors. The staffing complements and ratios per 500 patients in key categories are represented in Tables 11 and 12 in the annexure and in Figure 2 below. Despite the presence of norms, levels of staffing and the nature of the teams varied considerably between sites.

Six of the sixteen sites fell below the recommended Comprehensive Plan norms for medical staff, and seven fell below the norms for nursing and eight for lay counselling staff, respectively. Staff: patient ratios depended in part on the age of the site, with more recently established sites (e.g. site 7) being less efficient than older sites, and in part on the extent to which sites were capable of mobilising resources to increase staff establishments as numbers of patients increased. There was also provincial variation, with better availability of medical staff (in some sites instances above the norms) in the Western Cape than the other two provinces. Free State and Gauteng, in turn, had more consistent administrative staffing (Table 11).
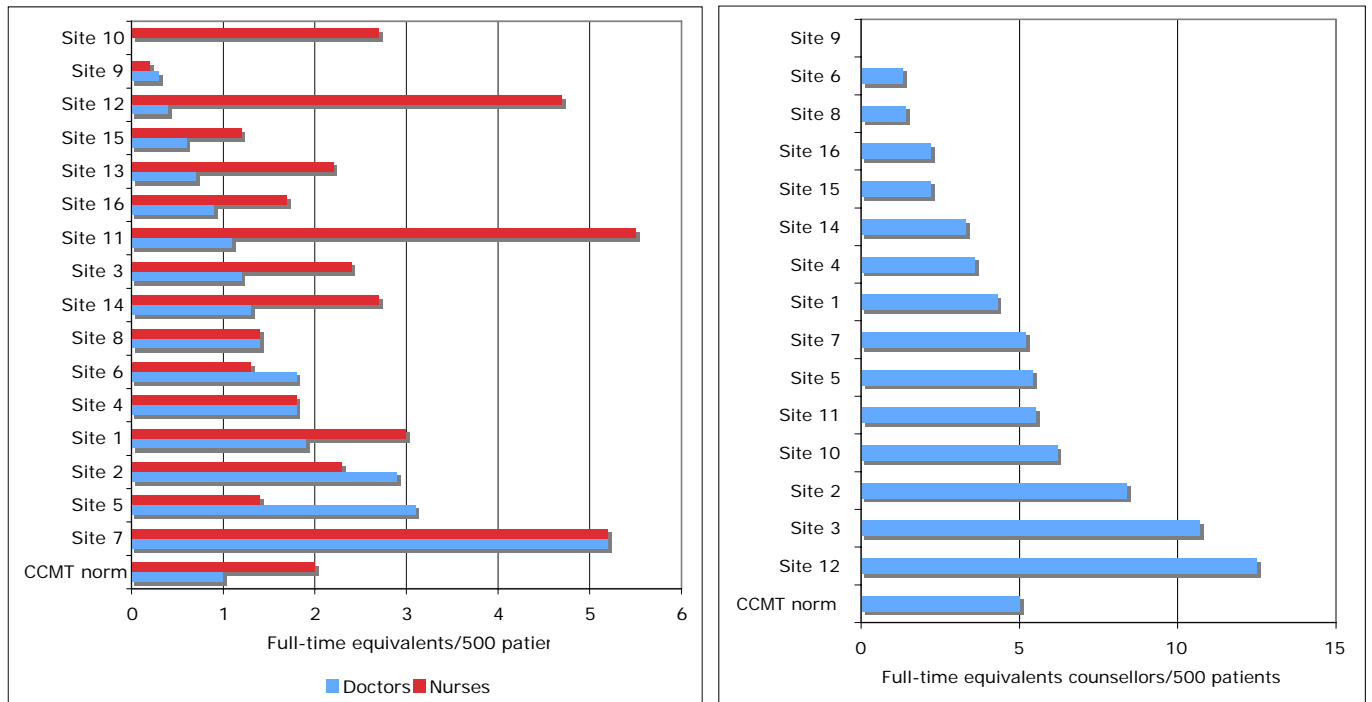
Figure 2: Full time staff/500 patients relative to CCMT norms for doctors, nurses and counsellors

Sites with low doctor patient ratios had better nurse: patient ratios, suggesting a degree of substitution of tasks. The presence of lay workers was unrelated to the availability of other personnel and was most prominent in the NGO provided or supported models. This included the Catholic Relief Service (site 12), which in addition to a large number of counsellors, also had the services of 28 part-time home-based carers.

All but two sites had a pharmacist or pharmacy assistant available, albeit on a part-time basis in some sites (Table 11). Only three sites had full-time dieticians and ten sites had the services of a social worker or psychologist.

5.1.2 Provider roles

Doctors were implicated in the initiation of treatment in all sites (Table 3), with or without the involvement of other members of the team. In the Free State, a split model was instituted where treatment initiation occurred separately (in centralised "treatment sites") from the screening, treatment preparation and follow-up processes (PHC-based "assessment sites") in a number of districts. In the more sparsely populated district of Xhariep, a modified approach was adopted where doctors came to peripheral facilities for a day or two a week (rather than expecting patients to travel), to provide treatment initiation services (so-called "combined sites"). This idea of "delocalised" doctor services was also present in the specialist paediatric support provided to the ART sites based in George.

12

Figure 3: Provider involvement in each stage of care pathway

Facility No	Name	Staging and wellness	Treatment preparation	Work up and initiation	Clinical Follow-up	Adherence & follow-up monitoring &support	Dispensing
Western Cape							
1	GF Jooste	Done prior to referral	Counsellor, doctor	Doctor, pharmacist	Doctor	Pharmacist, counsellor	Pharmacist
2	Gugulethu	Done prior to referral	Counsellor	Doctor, counsellor, pharmacist	Doctor	Pharmacist, counsellor	Pharmacist
3	Hout Bay	Nurse	Counsellor, dietician, social worker	Doctor, nurse, pharmacist, counsellor	Doctor, nurse	Pharmacist, counsellor	Doctor, nurse (pre-packed)
4	Michael M	Done prior to referral	Counsellor	Doctor, nurse, counsellor	Nurse, doctor	Counsellor, clerk	Doctor, nurse
5	TC Newman	Done prior to referral	Counsellor	Doctor, counsellor, pharmacist	Doctor	Nurse, counsellor	Doctor, nurse
6	Harry Comay	Nurse, doctor	Counsellor	Doctor, counsellor	Doctor, nurse	Nurse, counsellor	Pharmacist
7	Thembalethu	Nurse	Counsellor	Doctor, nurse, pharmacist, dietician, psychologist, counsellor	Doctor, nurse	Counsellor, nurse	Pharmacist
8	Knysna	Nurse, doctor	Counsellor	Doctor	Nurse, doctor	Clerk, counsellor	Pharmacist
Free State							
9	National	Done prior to referral	Done at PHC sites	Doctor, nurse, dietician, social worker	Doctor	Doctor, nurse, pharmacist	Pharmacist
10	Refengkgotso	Nurse	Counsellor, nurse, dietician	Doctor (referral site)	Nurse, doctor (referral)	Counsellor, nurse, dietician	Nurse (pre packed)
11	Itumeleng	Nurse	Counsellor, nurse, dietician, social worker	Doctor, dietician, pharmacy assistant	Doctor, nurse	Counsellor, nurse, dietician social worker	Pharmacist
12	Siyathokoza	Nurse	Counsellor, nurse	Doctor	Nurse	Counsellor	Nurse
Gauteng							
13	NH	Nurse	Counsellor, nurse, dietician, social worker	Doctor	Doctor, nurse	Pharmacist, pharmacy assistant counsellor, social worker	Pharmacist, pharmacy assistant
14	CH	Nurse	Counsellor	Doctor	Doctor, nurse	Pharmacist, clerk, counsellor	Pharmacist
15	SC	Nurse	Counsellor, social worker	Doctor	Doctor, nurse	Pharmacist, counsellor	Pharmacist
16	EC	Nurse	Counsellor, dietician, doctor	Doctor	Doctor, nurse	Pharmacist, counsellor, NGO	Pharmacist

Nurses generally managed the screening/staging processes and 'wellness' phases of care. They were also involved in the clinical follow-up of patients between scheduled doctor visits. In three sites, (Michael M, Siyathokoza, Knysna) nurses had been delegated the primary responsibility for the follow-up function (taking on some of the clinical tasks normally performed by doctors). This was made possible by the introduction of triage processes and tools (see case study of Michael M below). These changes reflect the early phases of what has now become a broader national trend towards nurse-based HIV care across the country.

Nurses also played a crucial managerial role in many sites, often ensuring continuity of care and setting the "tone" of the service in the context of high turnover of other cadres. In Gauteng, strong nurse leadership was identified as a key factor in site performance and motivation of staff.

Case Study 1 - Nurse-based care at Michael Mapongwana CHC

The evolution over time of clinical roles in the HIV service at Michael Mapongwana Community Health Centre (MMCHC) demonstrates the potential of integrated doctor-nurse care teams. When the clinic began operating in 2000, one doctor, one nurse and one counsellor were employed. As the service load increased, an additional nurse was brought on board and extra counsellors. Until late 2003, a second doctor only assisted on one day a week, with the usual clinical team comprising one doctor and two nurses.

The nurses employed were not formally trained clinical nurse practitioners, but professional nurses who received clinical HIV training and mentorship from the NGO, *Médecins sans Frontières*. Key to the success of the model is the triage of patients each morning in order to determine who should see the doctor. The main content of the nurse-consultations is to screen patients for complications (principally weight and symptom and signs screen), to check on adherence, and to ensure blood work is up to date. Dispensing has until now also occurred during the consultations.

The consulting rooms are linked by a corridor at the back, allowing easy movement of practitioners. This has been key to mentorship and team work. Important enablers of the nurses fulfilling a clinical role have been a combination of stability (at the time of the study both professional nurses had been working in the programme for around two years) and the constant interaction with doctors (the turnover of doctors has been greater, but most doctors have stayed a full year). This form of clinical interaction assists both doctors and nurses alike in developing skills and insights into patients. The lack of continuity of care that results from a triage system (where the same doctor does not see the patient every visit unless there are complications) is mitigated by the ability of staff to consult each other about patients which is facilitated by the clinic layout.

The nurses, due to the nature of the consultations and language issues, typically see 30 to 40 patients a day each, whereas the doctors see between 10 and 20 complicated cases. This results in a service that is in relative terms more efficient than one relying solely on doctors for clinical care.

Short-term clinical rotations are standard for young doctors, who will often spend 6 months or a year doing a particular rotation before moving on to something different, whereas there tends to be more stability with nurses, as had been the case in this clinic until recently. This is also the source of one of the concerns with the system, that of burnout – seeing 40 patients a day, five days a week, and dealing at the same time with the ever changing environment and patient load, is a strain for nurses, and the first nurse at MMCHC HIV service in fact requested a transfer to the rape survivors clinic after two years for this reason. A second concern is that seeing the nurses becomes a fast-track for patients eager not to spend the entire day waiting to be seen by a doctor. Consequently without a system that explicitly ensures that each patient sees a doctor at least annually, it is possible for stable patients to be seen quarterly only by nurses for years, without the opportunity for a doctor to consider possible long term toxicities and other clinical issues. Explicit schedules to ensure at least annual review by a doctor are desirable in this context.

A striking feature of many sites was the multi-provider involvement at certain moments of the care pathway. This was most notable in the treatment preparation and initiation phases, where apart from doctors, nurses and counsellors, patients also frequently saw social workers and dieticians, and in some instances pharmacists. In several sites, team meetings were also held to discuss selection of patients for treatment. One site (Itumeleng in the Free State) went so far as to convene panels where patient knowledge and treatment readiness were tested. However, this practice was subsequently dropped, as it was perceived to be intimidating and unnecessary.

The greatest variation in provider roles between sites occurred around the remaining members of the team, in particular amongst pharmacists, counsellors and administrative staff.

Pharmacists or pharmacy assistants generally dispensed medication, apart from two sites where doctors and nurses issued drugs from cupboards in their consulting rooms. Pharmacists also supervised the packaging of named supplies in central pharmacies (Free State). However, in many places, the role of the pharmacist went beyond these conventional activities to include individual adherence counselling and monitoring, and involvement in treatment initiation decisions. These roles were suggested in the national treatment guidelines (DOH 2004). In the absence of patient registers (such as in Gauteng), pharmacists also tended to have the most accurate handle on who was and was not returning for treatment in their site. However, in the face of increasing numbers, high turnover and massive scarcity of pharmacists in the public health system, these 'ideal' pharmacist roles have proved unrealistic and difficult to sustain.

While referred to generically as lay counsellors in this report, lay workers in the sites reviewed were variously called adherence counsellors, patient advocates, home-based carers and community health workers, reflecting their somewhat informal status as NGO-employed workers in the health system. Yet in all but one site they were a critical element of the service provided. Their key responsibility was in the treatment preparation and adherence monitoring and support dimensions of care. Lay workers also often performed a variety of minor yet integral roles in the clinic's functioning, such as making bookings, performing pill counts, weighing patients and taking temperatures and other minor administrative tasks. Overall, however, there was little standardisation in the organisation of their work (such as community versus facility based activities), the degree of role definition, their integration into professional teams and support received from professionals (psychologists or social workers). Not surprisingly, views on their functioning were also varied. In one site, the facility manager believed the lay workers were not being used effectively and needed better supervision:

> "I think it's a very good thing but I think, to be quite honest, I don't think they are being used effectively. If you compare them with the DOT supporters, for instance, I think we get the maximum out of the DOT supporters, whereas we don't get that out of the patient advocates. Initially I thought the difference was due to lack of supervision, and basically now, it's gone a bit better, but I still feel that they need more of supervision. I still feel that their usefulness could be improved with better management." (Pienaar et al 2006:26)

In another site, counsellors, especially those living with HIV, were seen as highly effective by a medical officer:

> I think also if you look at the model, the model is that you take – say our counsellors are HIV-positive, the vast majority of them and most of them on treatment – so you are basically taking patients and you are turning them into

adherence counsellors and I think that is an excellent system. … I just had a counsellor today and there was a young patient who was going to start treatment today and she was obviously quite frightened and she started crying, and the mother started crying at a certain stage, and the counsellor immediately started talking about that she was on treatment, what her CD4 was when she started treatment, what it was now, and you could see the effect it was having, it just works very, very well, and I think the counsellors are quite dedicated because of that, they have been through that struggle." (Pienaar et al 2006:29)

In this site, lay workers also happened to benefit from some form of career pathing in the service. Of the 24 counsellors employed at the facility, one was referred to as a "head counsellor", three "intermediate level" counsellors and the remaining nineteen, "community-based" counsellors. Another site had also established some kind of reporting hierarchy amongst lay workers.

5.1.3 User views and preferences on providers

In the light of trends of a shift from doctor to nurse-based clinical care, patients were surveyed as to their preferences for clinical providers in the Western Cape and Free State, where nurse-based care was most established. Patients were asked, "In general, would you prefer to see a doctor or a nurse when you come to the clinic?" Responses followed the pattern of service provision in the site. In predominantly nurse-based services (e.g. Refenkgotso), nurses were preferred, in doctor-based services (e.g. GJ Jooste, National), doctors preferred, and in mixed approaches (e.g. Michael M, Knysna) a combination was preferred. These findings suggest an acceptance of nurse-based models of care.

Figure 4: Preferences for providers in the Western Cape and Free State

Facility No	Name	n	Nurse (%)	Doctor (%)	No preference or both (%)
Western Cape					
1	GF Jooste	133	4	93	4
2	Gugulethu	183	10	89	1
3	Hout Bay	110	2	79	19
4	Michael M	207	39	41	20
5	TC Newman	116	9	89	2
6	Harry Comay	109	1	61	38
8	Knysna	193	8	45	47
Free State					
9	National	130	1	85	14
10	Refengkgotso	79	98	3	0
11	Itumeleng	62	86	8	6
12	Siyathokoza	90	37	58	6

In the Western Cape patients were asked "Who helped you the most to learn about HIV and ART?". Counsellors played the most significant role across sites, confirming their importance in education and communication (Figure 5). Doctor involvement in patient communication was also rated highly in some sites. Reading material featured low in the list of "providers".
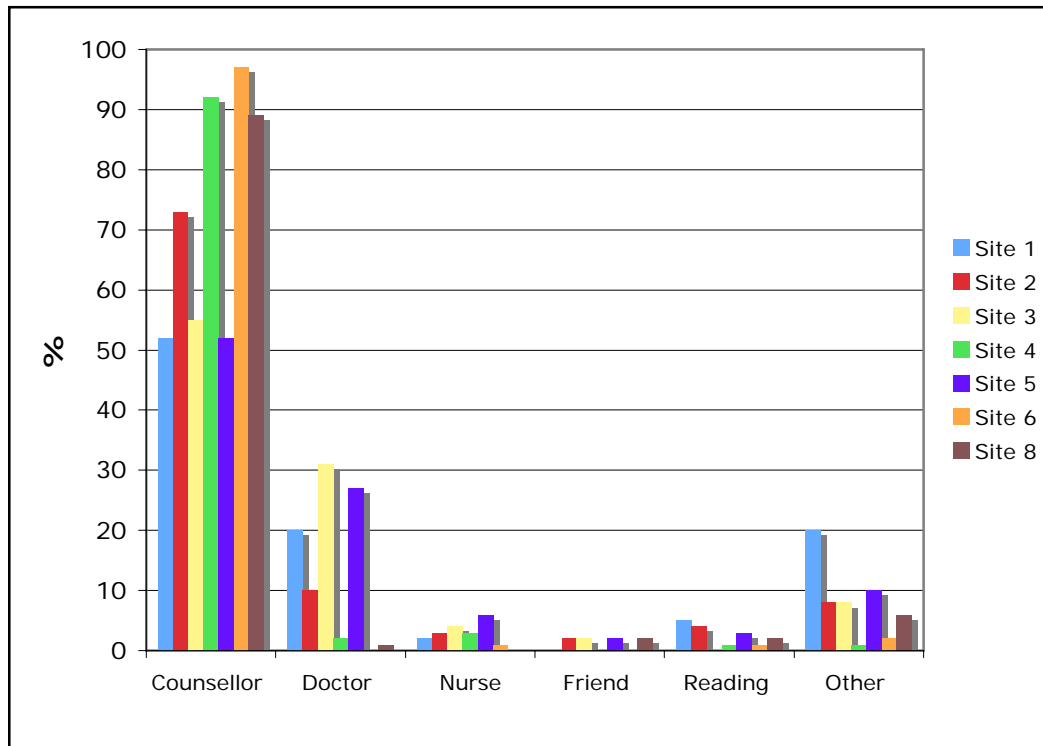
Figure 5: Patient perceptions of most useful providers in educating them on HIV/ART in Western Cape sites

5.2 Pathways of care

Pathways of care, also referred to as clinical pathways or collaborative care pathways are *"structured, multidisciplinary plans of care that … provide detailed guidance for each stage in the management of a patient … with a specific condition over a given time period, and include progress and outcomes details."* www.openclinical.org/clinicalpathways.html. The purpose of defining care pathways is to minimise access barriers and ensure continuity of care for people with chronic diseases.

With respect to ART, the key elements of the care pathway are:
- Staging
- Treatment preparation
- Treatment initiation
- Early clinical follow-up
- Maintenance follow-up
- Management of adherence
- Monitoring outcomes
- Modifying treatment

The national treatment guidelines spell out clear procedures for screening, selection, preparation and follow-up of patients, and to some extent prescribe roles for various members of the team in the procedures.

All sites reviewed had active preparatory periods prior to initiation of treatment, involving several team members. Some of the procedures such as the team

meetings and the panels referred to earlier appeared to be local interpretations of the patient selection criteria and processes outlined in the national guidelines. The selection criteria include disclosure of HIV status, the presence of patient "insight", and the necessity of multi-disciplinary team involvement (DOH 2004). However, by the time of the site evaluations were conducted these practices were becoming framed less as "selection" (i.e. the possibility of refusing ART) than as clinical screening (e.g. in particular excluding tuberculosis), treatment preparation and drug readiness training (see adherence management later).

As outlined in the guidelines, most sites required patients to attend facilities several (at least three) times before initiating treatment. However, sites differed in the intensity of doctor involvement in this phase, where patients were to be seen, and whether services were provided serially or simultaneously. For example, in the Knysna and Michael Mapongwana sites, the routine practice was one visit to doctors; in the Free State and Harry Comay sites patients were required to see doctors twice; at the Gugulethu site three times. In the Free State, where the processes of treatment preparation and initiation occurred in separate facilities, patients went through a provincially defined process over 8 weeks ("patient walk through model") that involved the following stages (Jacobs et al 2008:24):

- Patients are screened and staged by nurses in assessment sites (week one)
- Patients collect blood results (week two)
- Patients who qualify for treatment are referred to their nearest treatment site where a doctor assesses and confirms the patient's eligibility for treatment, assisted by the patient selection criteria included in treatment guidelines and exclude any possible opportunistic infections (week three)
- Patients are referred back to the assessment sites for drug readiness training (DRT) lasting three weeks (week four to six)
- After DRT patients are referred back to the treatment sites to the doctor for clinical review, consultation with a pharmacist and initiation of treatment (week 7)
- Regular follow-up of patients at both treatment and assessment sites would follow (week eight onwards).

This approach to the care pathway prioritised "quality care" for the ART programme, while seeking to facilitate access to medication between doctor visits through the primary health care system. While the number of times patients need to see more skilled professionals such as doctors and pharmacists may seem trivial, in practice such decisions can have key implications for access. The Free State model described above was implemented against a background of severe shortage of doctors. Major bottlenecks were soon experienced at the initiation (treatment) sites. Combined with the patient costs (see later) incurred in repeated travel to treatment sites, this created access difficulties. The result was a high level of mortality between screening and treatment initiation (Fairall et al 2008). The model is thus currently being simplified, with experienced nurses in assessment sites taking on more responsibility for initiation and follow-up of patients.

At the time of the evaluations, several sites had or were reviewing the degree of provider involvement and the frequency of visits in the follow-up of patients. Decision support tools and triage processes were introduced to facilitate this process. At Michael Mapongwana a checklist for nurse-based follow-up of patients was developed (see case study above); at Knysna and Gugulethu a structured assessment at six and four months, respectively (based on viral loads and adherence), sorted patients into "green" and "red" sticker patients and different pathways of follow-up.

The national guidelines state that patients are to attend sites monthly to receive treatment. In one Gauteng site (SC) the dispensing function (managed by the pharmacist) proved to be a key bottleneck. A high proportion (29.3%, n=194) of patients attending this facility had not been able to receive their monthly supply of medication on at least one scheduled follow-up date and had been asked to return on a later date. Several sites had begun to dispensed two month's supply to stable and adherent patients. In two sites the task of dispensing was managed by doctors and nurses, thus removing the need for pharmacy staff at the point of service delivery altogether.

The three provinces had a centrally designed ART/CCMT information system that involved specific reporting forms for the public sector sites. The Western Cape and Free State had structured clinical and patient retained records. Sites in both provinces reported on individual patient outcomes over time thus allowing for cohort analyses, whereas in Gauteng, reporting was cross-sectional and monthly. The Western Cape facilities also had a standardised manual register that theoretically allowed for clinical and programmatic monitoring at facility level. However, the evaluations in this province found that staff do not value the register or use it to assess outcomes.

Overall, the emphasis of provider attention and preoccupation in many sites was on the treatment preparation and initiation phases and less on the follow-up and monitoring of outcomes at patient and facility levels. An indicator of this could be the variable extent to which follow-up tests (CD4 counts and viral loads) were done and recorded in patient files (Figure 6). In six sites, a quarter or more of patients had not had their six-monthly viral load or CD4 count done.

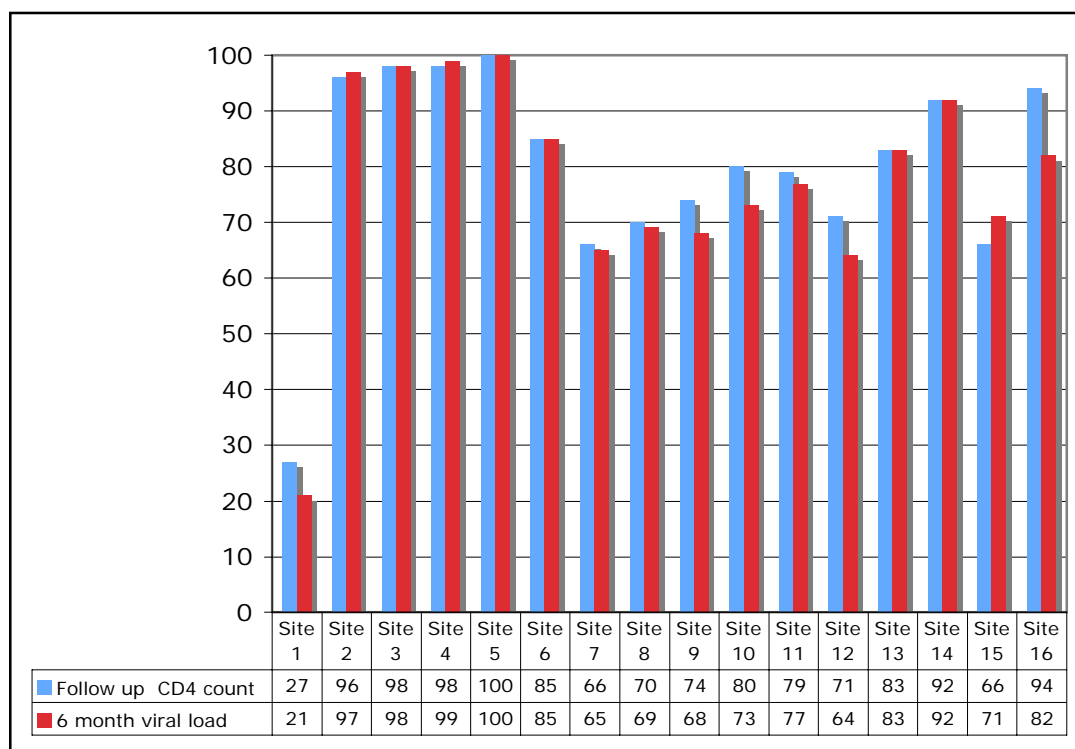|	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16
Follow up CD4 count	27	96	98	98	100	85	66	70	74	80	79	71	83	92	66	94
6 month viral load	21	97	98	99	100	85	65	69	68	73	77	64	83	92	71	82

Figure 6: Availability of viral load tests and follow-up CD4 counts in patients on treatment for at least six months

(Source: Cohorts enrolled Oct-Dec 2004 (facilities 1-5) and the whole of 2006 (facilities 6-8) in the Western Cape, and record reviews in Free State and Gauteng Provinces

5.3   Management of adherence

In all sites, the management of adherence involved an extensive period of treatment preparation, provided largely by lay workers/counsellors. This took the form of both individual counselling and structured group education (in thirteen sites), and the building of ARV "literacy". In fourteen of the sixteen sites and in five sites home visits were also conducted (Table 4). Patients were asked to nominate a treatment supporter or buddy in 14 sites, received pill-boxes in four sites, were provided with tick sheets in nine sites, and had access to support groups at eight sites. Adherence checks (self reported adherence or pill counts) were reportedly routinely conducted at follow-up visits, a task also often delegated to counselling staff.

Table 4: Approaches to management of adherence

Facility No	Name	Treatment preparation	Coun-selling	Group education	Home visit	Consent or contract	Treatment support	Pill boxes	Treatment supporter	Remin-ders*	Support groups	Managing problems	Home visits	Booster counselling/ education
Western Cape														
1	GF Jooste		Y	N	N	N		N	Y	N	N		N	Y
2	Gugulethu		Y	Y	Y	N		N	Y	N	Y		Y	Y
3	Hout Bay		Y	Y	Y	N		N	Y	N	Y		Y	Y
4	Michael M		Y	Y	N	Y		Y	Y	N	Y		Y (+/-)	Y
5	TC Newman		Y	N	Y	N		Y	Y	N	N		Y	Y
6	Harry Comay		Y	Y	N	Y		N	Y	Y	Y		N	Y
8	Knysna		Y	Y	N	N		Y	Y	Y	N		N	Y
Free State														
9	National		N**	N	N	N		N	N	N	N		N	Y
10	Refengkgotso		Y	Y	N	N		N	Y	Y	N		N	Y
11	Itumeleng		Y	Y	N	Y		N	Y	Y	Y		N	Y
12	Siyathokoza		Y	Y	Y	N		N	Y	Y	N		Y	Y
Gauteng Province														
13	NH		Y	Y	N	N		N	N	Y	N		N	Y
14	CH		Y	Y	N	N		Y	Y	Y	Y		N	Y
15	SC		Y	Y	Y	N		N	Y	Y	Y		Y	Y
16	EC		Y	Y	N	Y		N	Y	Y	Y		Y	Y
Total out 16			15	13	5	3		4	14	9	8		7	16

* tick sheets and teaching patients techniques such as scheduling, pill counting etc ** done at "assessment" sites

Defaulters were identified in various ways (often by the dispensing pharmacist) and contacted telephonically or through home visits. As sites became larger, however, the ability to monitor and trace those lost to follow-up reportedly became more difficult. Weak design and use of information systems contributed to this.

The uptake of specific adherence strategies was not uniform across sites confirming different approaches to adherence management (Table 5). At the Gugulethu site the emphasis was on the home visiting programme, at Michael Mapongwana the mandatory selection of a treatment supporter and the issuing of pill boxes, and in the Free State the nomination of "treatment buddies". Participation in support groups was variable across sites in the Western Cape and consistently low in Gauteng. Support groups were not offered as part of treatment support strategies in the Free State sites and participation was therefore not assessed.

Table 5: Uptake of treatment support strategies

Facility No	Name	n	Pill boxes (%)	Facility support groups (%)	Community support group (%)	Treatment supporter (%)	Home visit (%)
Western Cape							
1	GF Jooste	133	23	16	9	68	0
2	Gugulethu	183	13	35	22	85	94
3	Hout Bay	110	2	47	7	61	40
4	Michael M	207	100	68	10	99	2
5	TC Newman	116	3	8	21	78	43
6	Harry Comay	110	50	6	11	73	0
8	Knysna	194	5	8	2	88	10
Free State							
9	National	130	Not assessed			61	Not assess-ed
10	Refengkgotso	79				71	
11	Itumeleng	62				71	
12	Siyathokoza	90				79	
Gauteng Province							
13	NH	191	Not assess-ed	6*		Not assessed	
14	CH	164		13			
15	SC	194		13			
16	EC	164		19			

* belong to any support group

Treatment literacy in patients attending the Gauteng sites was assessed as an indicator of the success of treatment preparation phases. Misconceptions regarding ART were low (Table 6). Apart from one site (SC) that had benefited from a treatment literacy programme provided through an NGO, the percentage of patients able to name their drugs was relatively low, although a high proportion were able to state their latest CD4 count. This suggests good communication with patients in the follow up of care.

Table 6: Treatment literacy amongst CCMT site users Gauteng (n=713)

	NH n=191	CH n=164	SC n=194	EC n=164
Percentage giving correct answer (true or false) to following:				
o Unprotected sex is safe when one is taking ARVs	99	90	99	99
o People receiving ARVs can still transmit HIV to other people through unprotected sex	97	80	96	96
o It is acceptable to stop ARVs after gaining weight	98	93	99	97
o It is acceptable to stop ARVs when one no longer suffers from opportunistic infections	99	93	97	97
o ARVs cure HIV/AIDS	91	89	95	91
o After a couple of years one can stop taking ARVs	97	95	99	97
o Missing a few tablets of ARVs is acceptable	99	96	99	99
Percentage able to:				
o Name ARV drugs	39	37	71	34
o Point to ARV drugs on a chart	56	48	95	66
o State latest CD4 count	87	78	90	94

5.4   Integration

The management of ART has an added complexity in that it often occurs simultaneously with other care needs, such as pregnancy or the treatment of tuberculosis. As people in the reproductive age-group, those receiving ART will also be attending follow-up services such as child care and contraceptive services. They may thus be implicated in multiple visits to separate health services each month. The degree to which these various care needs can be addressed concurrently while maintaining quality is an important consideration in service design.

Despite the policy intention of providing "comprehensive" HIV care across the course of the disease, the majority of sites functioned as stand alone HIV clinics, in three instances focusing exclusively on ART provision. None of the sites offered what could be regarded as a full core package of HIV services - voluntary counselling and testing (VCT), staging of illness (CD4 counts), wellness management, prophylaxis and treatment of opportunistic infections (OI), tuberculosis (TB) care, and the prevention of mother-to-child-transmission. On the contrary, as the numbers of patients and pressure on sites increased, the tendency was to cut back on non-core HIV services. Staff also simultaneously expressed the need to mainstream HIV care into the public health system through processes such as "decanting", "down-referral" and nurse-based initiation and follow-up of patients.

Ten sites had to refer patients to another facility (often involving another authority) for TB care (Table 7). Similarly, nine sites related to antenatal and PMTCT services located outside of their facilities. Primary health care-based sites in the Free State and Gauteng were the most likely to integrate functions within the HIV service and to provide the full package of services within their facility. Amongst the 713 patients surveyed in Gauteng, 95% agreed with the statement "When you need to obtain other care that they cannot provide at this clinic, you are given enough help to get to the right place".

Table 7: Provision of a core package of HIV services at the 16 sites

Facility No	Name	Services integrated in ART site	Referral services same facility	Referral services another facility
WC				
1	GF Jooste	ART, in-patient	-	VCT, staging, wellness & OI, TB, PMTCT
2	Gugulethu	ART	-	VCT, staging, wellness & OI, TB, PMTCT
3	Hout Bay	Wellness & OI, ART, TB,	VCT	PMTCT
4	Michael Mapongwana	Wellness & OI, ART	VCT, PMTCT	TB
5	TC Newman	Wellness & OI, ART	-	VCT, staging, TB, PMTCT
6	Harry Comay	Wellness & OI, ART, TB	Staging	VCT, PMTCT
7	Thembalethu	Wellness & OI, ART	VCT, PMTCT	TB
8	Knysna	Wellness & OI, ART	VCT, PMTCT	TB
Free State				
9	National	ART	VCT	Staging, wellness & OI, TB, PMTCT
10	Refengkgotso	Staging, wellness & OI, ART	VCT, PMTCT, TB	-
11	Itumeleng	Staging, wellness & OI, ART	VCT, PMTCT, TB	-
12	Siyathokoza	VCT, staging, wellness & OI, ART	-	TB, PMTCT
GP				
13	NH	ART	VCT, TB diagnosis	Staging, wellness & OI, TB, PMTCT
14	CH	Wellness & OI, ART	VCT, TB diagnosis	TB, PMTCT
15	SC	VCT, staging, wellness & OI, ART	TB, PMTCT	-
16	EC	Wellness & OI, ART	VCT, staging, TB, PMTCT	-

One of the most innovative efforts at integration identified during the evaluation was the amalgamation of the TB and HIV services at Hout Bay Clinic, where nurses became increasingly responsible for both services (see case study below). TB services are widely available across the country, and given the high level of overlap in the HIV and TB epidemics, constitute a key point for integrating ART services and expanding access to ART.

6   Access and utilisation

From data collected in exit interviews, patients attending the PHC-based sites were more likely to travel to the facility by foot than those attending hospital or referral sites (Figure 7). Three sites in particular, Hout Bay, Refenkgotso and Siyathokoza, had high degrees of physical access. In those not travelling on foot, the cost of travel per visit ranged from R3.50 to R22.

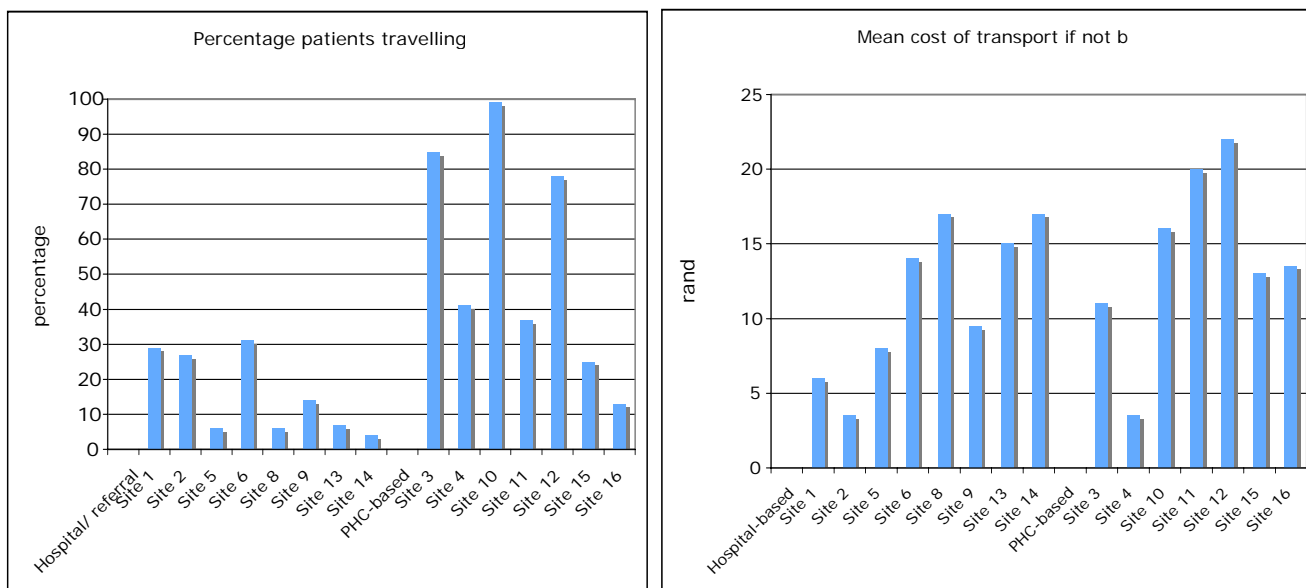**Figure 7: Proportion of patients travelling by foot and cost of travel in those not walking**

Exit interviews in all sites collected data on household assets, from which an asset index was constructed. The data for each province have been pooled and compared with the distribution of assets of the public sector dependent (non-medical aid) population, divided into ten equal deciles, where asset decile 1 has the lowest

availability of assets and asset decile 10, the highest. If one assumes that the distribution of need for HIV care is equal across socio-economic categories, then the utilisation of services in the three provinces is unequal between socio-economic groups. However, need is unlikely to be even between socio-economic groupings.[2] A more interesting comparison is that between provinces. Although having no patients in lowest decile, the Western Cape sites showed higher levels of utilisation in the lower socio-economic deciles (2&3) and a more even spread thereafter with a slight increase again in the richest decile. The Gauteng clinic users were concentrated in the 4th and 5th deciles pattern on the other hand, with almost no users in the highest deciles. In the Free State utilisation peaked in the 6th decile.
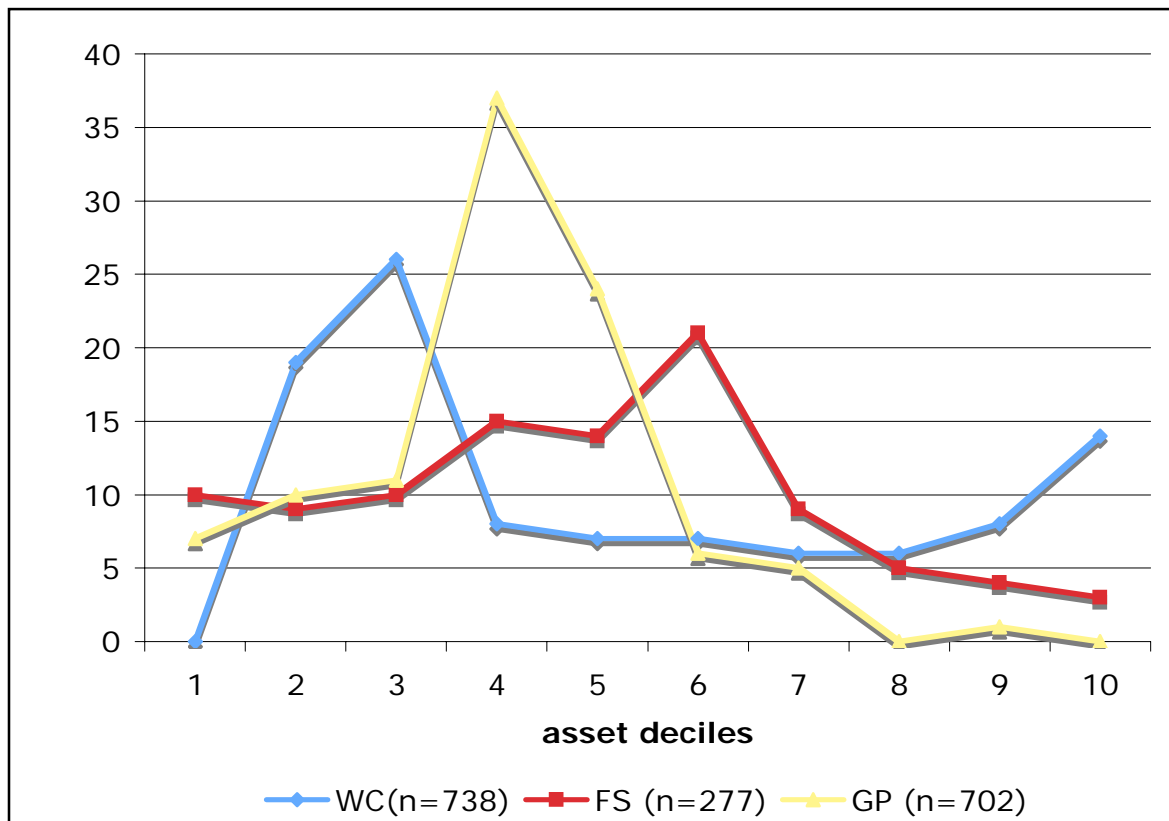
Figure 8: Socio-economic status of ART site attenders compared to background populations by province (Note: Southern Cape facilities not included)

7   Patient perceptions of care

Patient perceptions of the service were assessed in different ways. In the Free State and Western Cape provinces, more than two-thirds of patients in eight of the eleven sites surveyed felt that the quality of services at the sites were better than the other services available to them (Table 8). In certain sites, such as at the clinic in Hout

---

[2] Recent research in rural Kwazulu-Natal has shown a non-linear relationship between HIV and socio-economic status with households in the middle 40% of wealth having significantly higher infections rates than the poorest 40% and wealthiest 20% of households (Barninghausen et al 2007)

Bay, services were integrated and patients had limited access to other services, making comparisons difficult. Apart from one facility (TC Newman), opening hours were considered to be convenient for patients. Perceived stigma attending services was limited, apart from two facilities (the integrated service in Hout Bay and Michael M) where one-quarter of patients felt they were looked differently upon for attending the service.

Table 8: Patient perceptions of care

Facility No	Name	n	Quality of services better than others (%)	Clinic hours are convenient (%)	Perceived stigma* (%)
Western Cape					
1	GF Jooste	133	73	86	10
2	Gugulethu	183	83	87	8
3	Hout Bay	110	32	81	26
4	Michael M	207	53	94	24
5	TC Newman	116	72	47	13
6	Harry Comay	110	3	97	0
8	Knysna	193	93	84	11
Free State					
9	National	130	88	98	10
10	Refengkgotso	79	83	92	14
11	Itumeleng	62	82	97	2
12	Siyathokoza	90	92	98	10

* Answering "yes" to: "Do you feel that people in the community look upon you differently because you attend this clinic?"

The Gauteng study asked patients about their interactions with providers. The vast majority believed that the health workers cared about them, and had received feedback from providers on whether the drugs were working or not. A fair proportion felt that "some staff did not treat them with respect" and that language was an issue in communicating with providers (Table 9).

Table 9: Perceptions of interactions with providers amongst CCMT attenders, Gauteng (n=713)

	NH n=191	CH n=164	SC n=194	EC n=164
% agreeing:				
o The health workers I see care about me	95.3	97.0	92.3	96.3
o The health workers provided you with feedback on whether the drugs were working or not	97.9	94.5	97.4	92.7
o Some staff do not treat patients with sufficient respect	38.7	50.0	69.1	40.2
o It is a problem that the health worker doesn't speak your language	38.2	53.0	37.1	34.1

8   Outcomes

The outcomes in the various sites were assessed in a number of ways (Table 10). In all sites self reported adherence (three day recall) was assessed in exit interviews. In the Western Cape, the 6-month cohort data of patients enrolled in the study period were obtained from facility registers and reported in the routine information system. These formed the basis for evaluations of retention in care, viral load supression and CD4 counts. In the Free State and Gauteng Provinces, outcomes were obtained from record reviews of the patients interviewed (viral load and CD4 counts) and from staff interviews (drop out rates).

Apart from GF Jooste, a small proportion of patients reported missed doses in the prior three days. More than 85% of patients in the Western Cape were retained after 6 months. Similar estimates of retention in care were not possible for the Free State and Gauteng facilities, although cumulative retention in the Gauteng sites over the first 18 months to two years of operation was of the order of 70%.

A high percentage of patients across all sites (ranging from 84% to 100%) had undetectable viral loads. Half or more of the patients had CD4 counts above 200.

Table 10: Outcomes at the 16 ART sites

Facility No	Name	Missed dose last 3 days		Remaining in care		Viral load at 6 months <=400 copies/ml		Follow-up CD4 count >=200	
		n	%	n	%	n	%	n	%
Western Cape		τ		ϑ		ϑ		ϑ	
1	GF Jooste	133	14	43	81	7	100	9	56
2	Gugulethu	183	3	164	90	141	96	139	58
3	Hout Bay	110	3	61	92	52	96	52	56
4	Michael M	207	7	200	90	169	94	167	65
5	TC Newman	116	5	95	86	75	92	74	69
6	Harry Comay	110	3	215	87	138	84	139	70
7	Thembalethu			137	91	80	86	82	74
8	Knysna	194	6	235	86	130	89	131	71
Free State		τ		Ψ		*		*	
9	National	180	0			38	87	44	57
10	Refengkgotso	79	0			32	88	36	50
11	Itumeleng	62	0			38	95	41	54
12	Siyathokoza	90	0			30	97	33	61
Gauteng		τ		^		*		*	
13	NH	191	1		n/a	145	89	159	57
14	CH	164	2		72	133	84	151	54
15	SC	194	3		69	117	90	127	49
16	EC	164	1		70	145	92	154	43

τ From patient surveys

ϑ 6 month outcomes in cohort enrolled Oct-Dec 2004 for facilities 1-5 and cohort enrolled 2006 for facilities 6 & 8

* From record reviews

Ψ Data on retention in care not available from these facilities. Overall retention in care in FS Province in the early phases of implementation was 79% (Fairall et al 2007)

^ All patients over life-time of clinic (19-26 months). Represents a mix of cohorts, including more cohorts of patients recently initiated where mortality is higher, and also older cohorts (+12 months), where drop-outs are higher. These figures therefore are not strictly comparable with those of the other sites

Judged by self-reported adherence, outcomes were good at all sites. Comparisons on loss to follow-up are hard to make. However, in the Western Province, where the data on follow-up are more reliable, the model of service provision appeared to have little impact on outcomes. Small sample sizes in one of the Western Cape facilities (GF Jooste) and in the Free State limit comparisons on biological outcomes (viral loads, CD4 counts).

9 Discussion

The sixteen models reviewed all provide ART within the framework of national policies and guidelines. Outcomes across the sites appeared equally good, an indication that the public health system is able to assume the complex task of introducing and managing a new chronic disease care service. However, sites showed considerable variation in staff: patient ratios, the allocation of tasks amongst providers, roles in the ART service, provision of and access to related services, relationships with other facilities, and approaches to patient adherence and support.

In broad terms, the models can be categorised as follows:
- PHC/CHC-based: Hout Bay, Michael M, Knysna, Refengkgotso, Itumeleng, Siyathokoza, SC, EC
- Hospital based: TC Newman, Harry Comay, Knysna, NH, CH
- Stand alone referral ART service: Gugulethu, National
- Specialist referral support service: GF Jooste

The PHC based services performed no worse than other sites and were generally more accessible. Delegating clinical tasks to nurses also did not impact negatively on outcomes and was acceptable to patients. This was facilitated by the introduction of structured triage processes.

Differences in approach to implementation were evident between provinces. The Free State had the most standardised provincial approach to service provision in its public sector facilities, with elaborated pathways of care, task specification and referral and information systems. This province also split the assessment/treatment preparation from the initiation functions in an effort to widen entry into programme through the PHC system. The Western Cape models, on the hand, emerged more organically over time, and apart from a standardised provincial information system, systems and approaches were designed locally within sites. These sites were more likely to experiment with new systems (e.g. triage) in order to improve efficiency and access and simplify routines for patients. In this respect, the Western Cape sites are similar to the NGO model (Siyathokoza) studied. The Gauteng facilities studied followed the nationally defined format of the comprehensive "CCMT site", with few additional locally or provincially designed approaches or systems evident within sites.

All sites had systematic approaches to treatment preparation and initiation, which no doubt had an impact on outcomes. This was made possible by the extensive use of a diverse array of lay health workers, referred to and managed in different ways. The activities of lay health workers were more structured in some sites than others, with more clearly defined hierarchies and support than others.

Although all 16 sites were well-established and had been in existence for some time, they were in the main, able to manage the follow-up of patients while meeting the new demands for care presenting to their facilities. A few sites, however, (National,

NH, SC, Michael M) were already showing signs of saturation (such as waiting lists and patients not being seen on appointment days) and several were experiencing the first generation of staff turnovers, particular with scarce skills such as pharmacists and doctors.

The public sector ART programme has undergone massive expansion in the last two years, and faces a situation of ever increasing need. It is very likely that the findings in this report represent a situation already out of date. There is anecdotal evidence from particular sites to suggest that systems and performance (such as loss to follow-up) have not been maintained. The models of care reported here are undergoing review and modifications in all three provinces, shifting from a fairly vertical service to more decentralised and integrated approaches. It would be inappropriate, therefore, to recommend the scaling up of any particular model. However, the models presented here have elements that can inform the process of service expansion and adaptation, particularly with respect to:

- The possibility of mobilising the primary health care infrastructure for treatment
- Processes of task shifting in clinical functions from doctors to nurses and the decision support tools required to manage this effectively
- Triage systems that improve efficiency and create simplified follow-up routines for patients
- The use and management of lay workers
- The integration of HIV care into TB services
- The weak use of information in sites, underpinned by weak information systems in some areas
- The need for balance between standardised systems (e.g. information collection) and local innovation and flexibility
- The importance of structured provincial support systems as well as local site leadership

References

Barnighausen T, Hosegood V, Timaeus I, Newell ML. The socioeconomic determinants of HIV incidence: Evidence from a longitudinal, population-based study in rural South Africa. *AIDS* 2007, 21(suppl 7):S29.

Bedelu M, Ford N, Hilderbrand K, Reuter H. Implementing antiretroviral therapy in rural communities: the Lusikisiki model of decentralized HIV/AIDS care. *J Infect Dis* 2007; 196:S464–S468.

Bekker L-G, 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 Gugulethu, South Africa. *S Afr Med J* 2006; 96 (4):315-320.

Coetzee D, Hildebrand K, Boulle A, et al. Outcomes after two years of providing anti-retroviral treatment in Khayelitsha, South Africa. *AIDS* 2004; 18(6): 887-895.

DOH (Department of Health). *National Antiretroviral Treatment Guidelines. First Edition, 2004.* Pretoria: Department of Health. http://www.doh.gov.za/docs/hivaids-progressrep.html.

Fairall LR, Bachmann MO, Louwagie GM, et al. Effectiveness of antiretroviral treatment in a South African program: a cohort study. *Arch Intern Med.* 2008; 168(1):86-93.

Jacobs N, Schneider H, van Rensburg D. Rationing access to public-sector antiretroviral treatment during scale-up in South Africa: implications for equity. *African Journal of AIDS Research* 2008; 7(1): 19–27.

RHRU (Reproductive Health Research Unit). *Patient File Review Report: Tshepong Wellness Clinic Klerksdorp, North West Province, Republic of South Africa.* Johannesburg: RHRU; 2007

Van Damme W, Kheang ST, Janssens B, Kober K. How labour intensive is a doctor-based delivery model for antiretroviral treatment (ART)? Evidence from an observational study in Siem Reap, Cambodia. *Hum Resour Health.* 2007 May 1;5:12.

Western Cape Department of Health. *The Western Cape Antiretroviral Programme: Monitoring Report, June 2006.* Cape Town: Provincial Government of the Western Cape; 2006.

Annexure

Table 11: Full-time equivalents at 16 study facilities at time of assessment

Facility No	Name	Doctor	Nurse	Nurse auxiliary	Pharmacist	Pharmacy Assistant	Counsellor[+]	Dietician	Social worker/ psychologist	Clerical
Western Cape										
1	GF Jooste	1.4	2.2	1	1	2	3.2	-	0.1	2
2	Gugulethu	5	4	1	1	2	14.5	-	0.1	-
3	Hout Bay	0.5	1	-	0.2	-	4.5	-		-
4	Michael M	3	3	-	-	-	6	-		2
5	TC Newman	2.6	1.2	-	1	-	4.5	0.5		-
6	Harry Comay*	1.4	1	-	1	1	1	-	0.5	-
7	Thembalethu	1	1	-	1	-	1	-		0.5
8	Knysna*	1	1	-	1	1	1	0.1	0.5	1
Free State										
9	National	1.5	1	-	1	1	-	-	1	2
10	Refengkgotso	0	1	-	-	1	2.3	0.1	-	2
11	Itumeleng	0.2	1	1	1	0.5	1	1	0.2	2
12	Siyathokoza	0.1	1.2	0.8	-	-	3.2	-	-	0.8
Gauteng Province										
13	NH	2	6	-	1	1	2.5	1	0.5	2
14	CH	1	2	1	1	-	2.5	0.5	1	3
15	SC	1	2	2	1	-	3.5	1	1	2
16	EC	1	2	1	0.5	-	2.5	-	1	2

[+] Assumption that all counsellors work 20 hours per week, unless specified otherwise * Also had one driver

Table 12: Staff: patient ratios in key categories, and norms in the Comprehensive Plan*, at time of assessment

Facility No	Name	Patients on ART	Doctors/ 500 pts	Nurses/ 500 pts	Counsellor or CHW /500 pts	Pharmacist or pharmacy assistant /500 pts
CCMT norms/500 patients			1	2	2.5 (counsellors)	1 (pharmacist)
Western Cape						
1	GF Jooste	369	1.9	3.0	4.3	4.1
2	Gugulethu	864	2.9	2.3	8.4	1.7
3	Hout Bay	211	1.2	2.4	10.7	0.5
4	Michael M	835	1.8	1.8	3.6	0
5	TC Newman	416	3.1	1.4	5.4	1.2
6	Harry Comay	399	1.8	1.3	1.3	1.3
7	Thembalethu	97	5.2	5.2	5.2	5.2
8	Knysna	363	1.4	1.4	1.4	1.4
Free State						
9	National	2307	0.3	0.2	0	0.2
10	Refengkgotso	185	0	2.7	6.2	0
11	Itumeleng	91	1.1	5.5	5.5	8.2
12	Siyathokoza	128	0.4	4.7	12.5	0
Gauteng						
13	NH	**1365	0.7	2.2	0.9	0.4
14	CH	377	1.3	2.7	3.3	1.3
15	SC	804	0.6	1.2	2.2	0.6
16	EC	581	0.9	1.7	2.2	0.4

- three highest ratios in green, three lowest ratios in red ** estimate based on drop out rates in other sites