The HIV Care Continuum in Curaçao

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ABSTRACT

Objective: To determine the continuum of HIV care and factors associated with delayed entry and start of cART in Curaçao.

Methods: We analysed linkage to care, starting cART and viral suppression after cART for all 551 individuals who were newly diagnosed with HIV-1 infection in Curaçao between 2000 and 2010.

Results: After diagnosis, 367 (67%) individuals were linked to care, of whom 214 (58%) within 3 months after diagnosis. Being diagnosed before 2005 (odds ratio [OR] 0.40; 95% confidence interval [CI] 0.28-0.57) was independently associated with delayed entry (>3 months). Amongst 267 (48% of the 551) individuals who started cART, 166 (62%) individuals achieved viral suppression six months after starting cART, or 30% of all newly diagnosed. Pregnant women showed shorter time to treatment initiation (relative hazard [RH] 3.40, 95%CI 1.77-6.55) and advanced disease stage at entry was associated with a shorter time (RH 3.0, 95%CI 2.0-4.4).

Conclusion: Although improving over calendar time, individuals newly diagnosed with HIV-1 infection in Curaçao show inefficient entry and retention into care resulting in a low overall proportion of viral suppression.

Keywords: Caribbean, Continuum of care, engagement, HIV, linkage

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INTRODUCTION

During the last fifteen years, access to combination antiretroviral therapy (cART) has been scaled-up in the Caribbean region, which has resulted in a drop in the number of acquired immunodeficiency syndrome (AIDS)-related deaths from 20,000 in 2005 to 10,000 in 2011.(1) However, in many Caribbean countries, late presentation continues to be a major obstacle for a successful outcome of cART, in part because of barriers for HIV testing.(2-9)

The continuum of HIV care is a dominant paradigm in engagement in HIV care.(10) The care continuum outlines sequential steps necessary for successful treatment of HIV-positive individuals focusing on the total population of people living with HIV, HIV diagnosis, linkage to care, retention in care, initiation of cART, and viral suppression (11) The Joint United Nations Programme on HIV/AIDS 90-90-90 by 2020 initiative was established with the goal of achieving virological suppression in 90% of all people receiving cART by the year 2020 (12), emphasizing the need for data on virological suppression per country against which national cART implementation programs can be assessed.

In this study, we aim to determine the engagement in different stages of the continuum of care for individuals who were newly diagnosed with HIV-1 infection in Curaçao between 2000 and 2010. Besides, we investigate factors associated with delayed entry into care amongst newly diagnosed individuals and factors associated with delayed start of cART after entry.

SUBJECTS AND METHODS

Curaçao is a Caribbean island and part of the former Netherlands Antilles. It has approximately 140,000 inhabitants and the estimated HIV prevalence ranges from 0.61% to 1.05%.(12) According to national protocols, HIV diagnosis has to be confirmed by Western

blot technique on material screened positive for HIV. Centralized registration and monitoring of HIV-positive individuals in clinical and outpatient care began in January 2005, in collaboration with Stichting HIV Monitoring (SHM, HIV Monitoring Foundation) in the Netherlands.(13) In 2005, new guidelines on when to start cART were introduced in Curaçao, and these guidelines now follow those formulated by the United States Department of Health and Human Services (DHHS).(14)

Study population

Our study population consisted of individuals aged 15 years or older who were newly diagnosed with a confirmed HIV-1 infection between 1 January 2000 and 31 August 2010. These individuals were matched to patients in the SHM clinical database using date of birth, gender, and initials.(13) Date of entry into care was defined as the date of the first visit to the outpatient or inpatient HIV clinic, or the date of the first measurement of CD4 cell count or HIV-1 viral load, whichever of the three was earliest. Patients were considered as still being in care if they had a visit to the HIV care clinic and/or measurement of CD4 cell count or HIV-1 viral load after 1 January 2011. Among the patients who were retained in care, we determined the proportion of patients using cART and the number of patients with viral suppression (HIV-1 RNA <400 IU/ml) at the last measurement. Advanced disease stage at the time of entry was defined as CD4 cell counts below 200 cells/mm^3 or AIDS, regardless of CD4 cell count.(15)

Statistical analysis

Logistic regression models were used to analyse the impact of gender, age, year of diagnosis, and location of HIV test on whether or not patients entered into care within 3 months after diagnosis. Proportional hazards models and Kaplan-Meier techniques were used to analyse the time between entry into care and start of cART. Patients who did not start cART before

closure of the database, i.e., 1 March 2011, were censored at the date of their last clinical visit or at 1 March 2011, whichever of the two was earliest.

For 315 (86%) of the 367 patients who entered care, disease stage at the time of entry could be determined. A Markov Chain Monte Carlo method was used to impute values for the missing cases. This method took into account the dependency of CD4 cell counts on age at diagnosis, transmission risk group, region of origin (former Netherlands Antilles or not), year of diagnosis, AIDS at the time of diagnosis, entry into care within 3 months or not, and whether the patient died within 1 year after entry into care. In total, 100 datasets were generated in which values of the missing data were randomly sampled from their predicted distributions.(16) The model analyses were run on each dataset separately and the results were combined with Rubin's rules.(17)

We compared individuals who were diagnosed with HIV before 2005 with those diagnosed after 2005, because data collection and new guidelines had been implemented since. SPSS statistical software, Version 15.0 (Norusis; SPSS Inc., Chicago, Illinois, USA) and SAS software (version 9.3; SAS Institute, Cary, North Carolina, USA) were used for data analysis.

RESULTS

As of September 2010, 1425 confirmed HIV cases had been reported in Curaçao of which 551 were newly diagnosed in the period 2000 to the end of August 2010. (Table 1) Altogether, 367 (67%) of these 551 individuals had entered into care by March 2011 and 267 (48%) had started cART. (Figure 1) For 188 individuals a viral load measurement was available six months after starting cART and 166 (88%), or 30% of the 551 newly diagnosed, had achieved viral suppression. Among persons newly diagnosed in 2005 or later, a higher proportion

entered into care, were retained in care and achieved viral suppression compared to those diagnosed before 2005 (Figure 1).

As of January 2012, 213 individuals were still in care, whereas of the 154 (=367-213) individuals who were not in care anymore, 58 individuals were known to have died, and six individuals were known to have emigrated. Of the 213 individuals still in care, 179 (84%) were using cART and 149 individuals (83% of those on cART) showed viral suppression. Of the 367 individuals who entered into care, 214 (58%) had done so within 3 months after diagnosis. In a multivariate analysis, being diagnosed in the period 2005-2010 and, to a lesser extent, older age at the time of diagnosis were associated with a higher probability of entering care within 3 months (Table 2).

For 315 (86%) of the 367 individuals who entered into care, the disease stage at the time of entry could be determined. In total, 134 (43%) individuals were classified as being in advanced disease stage, while 121 (38%) individuals had 350 CD4 cells/mm^3 or more. Being diagnosed between 2000 and 2004, and older age at the time of diagnosis were independently associated with a higher probability of entering care in advanced disease stage (Table 3).

Among the 267 individuals who started cART, the median time between entry into care and start of cART was 8 weeks (interquartile range [IQR], 2-59 weeks). One year after entry, the proportion of individuals who had started treatment was 94% (95% CI, 89-97) for those with less than 200 CD4 cells/mm^3 or AIDS at the time of entry, 64% (51-76) for those with 200 to 349 CD4 cells/mm^3, and 20% (14-28) for those with 350 CD4 cells/mm^3. (Figure 3) Pregnant women started cART shorter after entry than other patient groups (relative hazard [RH] 3.40, 95%CI 1.77-6.55). Other covariates associated with a shorter duration to cART initiation were a diagnosis in later calendar years (RH 0.57 [0.43-0.73] for 2000-2004 compared to 2005-2010) and disease stage at entry with RH 3.0 (2.0-4.4) for individuals with

CD4 200-349 cells/mm^3 and 7.5 (5.1-10.9) for individuals with less than 200 cells/mm^3 or AIDS compared to those entering care with 350 cells/mm^3 or more. (Table 4)

DISCUSSION

In this study we analysed the different stages of the continuum of HIV care in individuals with a newly diagnosed HIV-1 infection in Curaçao. Although improving over time, the overall proportion of individuals in Curaçao with viral suppression is low as a result of inefficient linkage to care after diagnosis as well as poor retention in care before and after starting cART.

This study shows that linkage to specialised HIV care was inefficient with a vast proportion of newly diagnosed individuals (61%, 551-214=337), delaying entry or not entering care at all. In Sub-Saharan Africa, the proportion of patients assessed for cART eligibility after HIV diagnosis, which reflects linkage to care, was 57%.(18) In contrast, in the United States of America, the proportion of newly diagnosed patients not linked to care was much lower and varied between 12.8% and 31%.(19-21) Factors that have been associated with longer time to entry after diagnosis include lower CD4 cell count at diagnosis(22), long travel distance to the clinic(22, 23), ethnic minorities(19-21, 24), and intravenous drug users.(20) Intravenous drug use is not commonly practiced in Curaçao and since the geographic size of the island is rather small, we surmise that fear for stigmatization by entering a centralized clinic in a relatively small community rather than travel distance affects linkage to care. Others reported that women may enter care more rapidly because of routine HIV testing during prenatal care and integrated prevention-of-mother-to-child-HIV-transmission (PMTCT) services.(25, 26) Our study, however, did not show an association between gender and delayed entry.

We think that the current centralized HIV care model in Curaçao is failing in achieving its goals. All individuals who are newly diagnosed with HIV first have to be referred to the centralized clinic before starting cART, which increases the likelihood of delay. Integrating HIV care in primary health care services will probably shorten time between diagnosis and starting cART. Therefore, we propose an alternative HIV care model in which HIV care is integrated in primary health care setting (27).

This study includes all newly diagnosed HIV-1-positive individuals in one single country over a period of more than ten years, using exact time frames and thereby providing data for optimizing the effect of cART nationwide. However, our study has several limitations. First, limited additional demographic data were available for newly diagnosed HIV-positive individuals in Curaçao. Clinical data were only available for those patients who succeeded linkage to care, stressing the need to optimize surveillance data and guaranteeing linkage after diagnosis. Second, since the HIV care continuum is more dynamic (with patients being in and out of HIV care before and after starting cART and not a simple linear pathways assumed in our study), we may have overestimated the proportion of patients who achieved viral suppression. Previously we showed high incidence of intermittent care before and after starting cART. Also, during the study period of ten years, different guidelines were used of when to start cART, which may have influenced our results.

CONCLUSION

Individuals newly diagnosed with HIV-1 infection in Curaçao show inefficient entry and retention into care with subsequent poor rates of viral suppression. Aiming at improving the effect of cART, health care authorities of Curaçao should focus on scaling up HIV testing as

well as improving linkage and retention in care by integrating HIV care in primary health care.

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Table 1: Characteristics of all 551 HIV-positive individuals in Curaçao who are newly diagnosed between 2000 and 2010

	Diagnosis (N=551)		Entry (N=367)		Start cART (N=267)	
	N / Median	**% / IQR**	**N / Median**	**% / IQR**	**N / Median**	**% / IQR**
Sex						
Male	330	60	220	60	157	59
Female	221	40	147	40	110	41
Setting HIV test						
Primary care	306	56	215	59	156	58
Specialised care	245	38	138	38	105	39
Unknown	35	6	14	4	6	2
Year of diagnosis						
2000-2004	292	53	171	47	126	47
2005-2010	259	47	196	53	141	53
Entry in care						
≤3 months	214	39	214	58	157	59
>3 months	153	28	153	42	110	41
Never	184	33	-	-	-	-
Time diagnosis to entry [year]			0.19	0.07-0.57	0.19	0.08-0.57
Time entry to start cART [year]					0.16	0.04-1.14
Still in care by January 2012			213	58	179	67
Died			58	38	44	50
Moved abroad			6	4	4	5
Lost			90	58	40	45
Age [year]	39	31-46	40	33-47	41	34-49
Country of origin						
Former N.A.			261	71	197	74
Other / unknown			106	29	70	26
Patient group						
MSM			72	20	49	18
Other men			148	40	108	40
Pregnant women			29	8	21	8
Other women			118	32	89	33
CD4 at entry [cells/mm^3]						
<200			110	30	106	40
200-349			64	17	55	21
350-499			67	18	43	16
≥500			63	17	31	12
Unknown			63	17	32	12

cART, combination antiretroviral therapy; N, number; IQR, interquartile range; N.A., Netherlands Antilles; MSM, men having sex with men.

Table 2: Odds ratios (ORs) with 95% confidence intervals (CIs) for entry into care within 3 months after HIV diagnosis amongst 551 HIV-positive patients newly diagnosed with HIV-1 infection between 2000 and 2010

	Univariate			Multivariate		
	OR	**95% CI**	**P**	**OR**	**95% CI**	**P**
Sex						
Female	0.97	0.69-1.38	0.9	1.04	0.72-1.50	0.8
Male	1			1		
Age at diagnosis [year]						
<30	0.84	0.52-1.35	0.5	0.77	0.46-1.24	0.3
30-39	1			1		
40-49	0.98	0.62-1.53	0.9	0.78	0.49-1.26	0.3
≥50	1.54	0.95-2.52	0.08	1.31	0.78-2.20	0.3
Setting HIV diagnosis						
Specialized care	1.29	0.91-1.85	0.2	1.27	0.87-1.84	0.2
Unknown	0.41	0.18-0.98	0.05	0.45	0.19-1.08	0.07
Primary care	1			1		
Year of diagnosis						
2000-2004	0.40	0.28-0.57	<0.001	0.40	0.28-0.57	<0.001
2005-2010	1			1		

OR, odds ratio; 95% CI, 95% confidence interval.

Table 3: Odds ratios (ORs) with 95% confidence intervals (CIs) for advanced disease stage (CD4 200 cells/mm^3 or AIDS) at entry into care amongst 367 HIV-infected patients newly diagnosed with HIV between 2000 and 2010 who entered care. For 52 patients, disease stage at entry was imputed by imputing CD4 cell counts at the time of entry

	Univariate			**Multivariate**		
	OR	**95% CI**	**P**	**OR**	**95% CI**	**P**
Risk group						
MSM	0.85	0.46-1.58	0.6	1.02	0.53-1.97	1.0
Other men	1.54	0.93-2.56	0.09	1.37	0.80-2.33	0.2
Pregnant women	0.61	0.20-1.81	0.4	0.85	0.27-2.65	0.8
Other women	1			1		
Age at diagnosis (per 10 years older)	1.48	1.21-1.81	<0.001	1.44	1.16-1.79	0.001
Country of origin						
Former Netherlands Antilles	1.06	0.65-1.74	0.8	0.92	0.54-1.55	0.8
Other countries	1			1		
Setting HIV diagnosis						
Specialised care	1.60	1.02-2.51	0.04	0.92	0.54-1.55	0.8
Unknown	0.78	0.22-2.72	0.7	0.57	0.15-2.14	0.4
Primary care	1			1		
Year of diagnosis						
2000-2004	1.68	1.08-2.62	0.02	1.70	1.07-2.70	0.03
2005-2010	1			1		

OR, odds ratio; 95% CI, 95% confidence interval; MSM, men having sex with men.

Table 4: Relative hazards (RHs) and 95% confidence intervals (CIs) for time to start combination antiretroviral therapy (cART) after entry into care for 367 HIV-1 infected patients who were newly diagnosed with HIV-1 infection in Curaçao from 2000 to 2010 and entered into care

		Univariate			**Multivariate**	
	RH	**95% CI**	**P**	**RH**	**95% CI**	**P**
Risk group						
MSM	0.85	0.60-1.21	0.4	0.8	0.57-1.19	0.3
Other men	1.09	0.82-1.44	0.5	0.87	0.64-1.18	0.4
Pregnant women	2.24	1.39-3.63	0.001	3.40	1.77-6.55	<0.001
Other women	1			1		
Age at entry (per 10 years older)	1.15	1.04-1.28	0.008	1.10	0.97-1.23	0.1
Country of origin						
Former N.A.	0.97	0.74-1.28	0.8	1.08	0.78-1.48	0.7
Other countries	1			1		
Setting HIV test						
Primary care	1.05	0.82-1.34	0.7	1.27	0.96-1.67	0.1
Specialized care	1			1		
Year of diagnosis						
2000-2004	0.79	0.61-1.01	0.06	0.57	0.43-0.75	<0.001
2005-2010	1			1		
Disease stage at entry						
CD4 <200 cells/mm^3 or AIDS	6.0	4.3-8.4	<0.001	7.5	5.1-10.9	<0.001
CD4 200-349 cells/mm^3	2.6	1.8-3.8	<0.001	3.0	2.0-4.4	<0.001
CD4 ≥350 cells/mm^3	1			1		
Time to care after diagnosis						
≤3 months	1.12	0.88-1.44	0.3	1.21	0.92-1.59	0.2
>3 months	1			1		

RH, relative hazard; 95% CI, 95% confidence interval; MSM, men having sex with men; N.A., Netherlands Antilles; AIDS, acquired immunodeficiency syndrome.

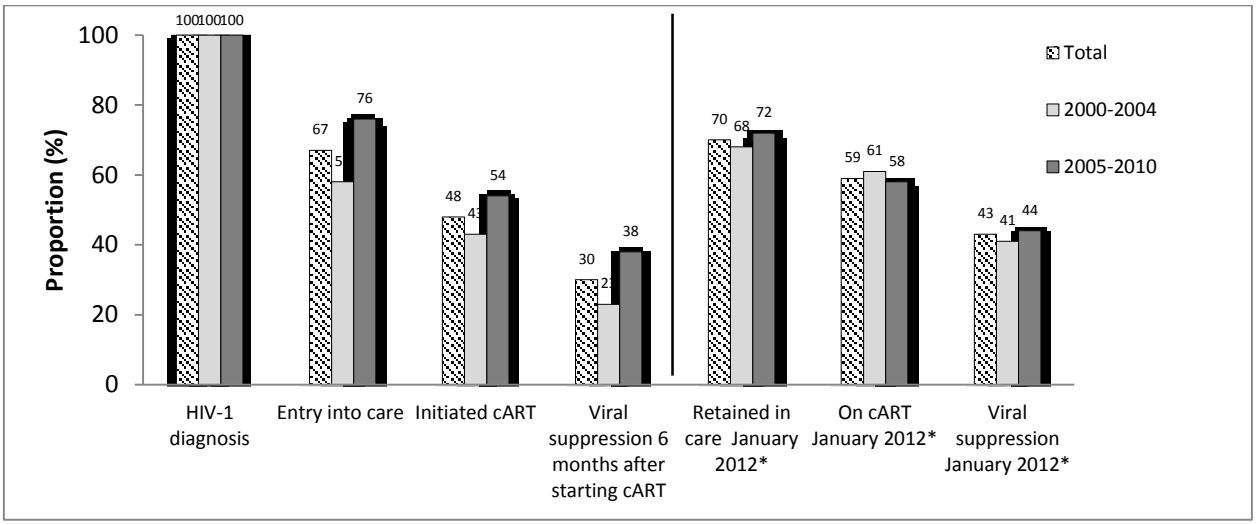

Figure: The continuum of HIV care in Curaçao for individuals diagnosed with HIV-1 infection between 2000 and August 2010 (striped, n=551) and for those who were diagnosed with HIV-1 infection before 2005 (light grey, n=286) or in or after 2005 (dark grey, n=265).

cART, combination antiretroviral therapy; Viral suppression 6 months after start, HIV-1 RNA measurement < 400 copies/ml; On- cART, using combination antiretroviral therapy.
*Proportion of individuals who are diagnosed with HIV-1 infection, who have entered into care and known not to have died or emigrated.