



# The HIV continuum of care in the Bahamas in 2014

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## ABSTRACT

**Objective.** *The HIV cascade of care describes the spectrum of engagement in HIV care from diagnosis to viral suppression (VS). The study objective was to develop a baseline HIV cascade of care for new HIV diagnoses in the Bahamas in 2014.*

**Methods.** *Individuals who were newly diagnosed with HIV in 2014 and known to be alive within a year of that diagnosis were included in the cascade of care (n = 250). Individuals with one CD4 or HIV viral load (VL) measure in 2014 were considered linked to care. Those with at least two CD4 counts in the year were considered retained in care. Eligibility for antiretroviral therapy (ART) was based on having a CD4 count < 350 cells/mm<sup>3</sup>. ART adherence was defined as filled prescriptions > 11 months/year. VL < 1 000 copies/ml was considered suppressed. Comparisons were made in the cascades by gender and age.*

**Results.** *Of the 250 persons in the study, 79 of them (32%) were retained in care. Antiretrovirals (ARVs) were prescribed to 116 of the 250 (46%); of those 116, 48 of them (41%) achieved VS. A higher proportion of women achieved VS than did men, but this difference did not reach statistical significance. Similarly, there were differences in VS based on age, but the differences were not statistically significant.*

**Conclusions.** *In the Bahamas, increased efforts are needed to help people living with HIV to link to and be retained in care. VS may remain suboptimal unless ART is scaled up and adherence interventions are included in measures to improve the treatment cascade.*

## Key words

HIV, continuity of patient care, Bahamas.

Infection with human immunodeficiency virus (HIV) without treatment leads to progressive immune system decline, opportunistic infections, and

malignancies. The era of antiretroviral treatment has significantly reduced the high and early mortality associated with HIV infection and the progression to the acquired immunodeficiency syndrome (AIDS) (1). Moreover, suppressing viremia through treatment results in “prevention through treatment,” that is, reduced transmission of HIV to sexual contacts (2).

The Bahamas is a country comprised of more than 700 islands in the North Atlantic Ocean. The archipelagic chain covers an area of 5 358 square miles (13 878 square km). Thirty of the islands are inhabited. In 2014, the Bahamas had a

projected mid-year population of 369 210 residents, of whom 178 440 were male and 190 770 were female (3). Geopolitically, the Bahamas is considered a part of the Caribbean.

Between 1985 and 2014, 13 366 persons were diagnosed with HIV in the Bahamas. An estimated 8 630 persons were believed to be living with HIV/AIDS in the Bahamas as of 31 December 2014 (4). Approximately 2% of persons living in the Bahamas in 2014 were HIV-positive.

All HIV tests done in the public sector are reported annually to the Bahamas Ministry of Health (MoH). The

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Bahamas mainly has a centralized model of HIV care. The majority of patients accessing the public health care system are seen in the Infectious Diseases Clinic at Princess Margaret Hospital on the island of New Providence. A small number of patients are seen in the community clinics on New Providence and other islands.

Improving care of people living with HIV (PLHIV) involves expedient diagnosis and linkage to care as well as retention in care, appropriate antiretroviral (ARV) treatment, adherence to treatment, and virological monitoring, with the goal of obtaining and sustaining viral suppression (VS). This continuum of HIV care is also known as the “treatment cascade,” and it represents important data for the provision of HIV-related treatment and services.

It has been put forward that optimizing HIV care and outcomes, eliminating health care disparities, and reducing HIV incidence are linked to involvement at every step in the continuum of services (5).

One of the first studies pertaining to the HIV treatment cascade was based on PLHIV in the United States of America. Of an estimated 1.2 million PLHIV living in the United States at the end of 2008, 80% had been diagnosed (6). Approximately 77% of persons diagnosed with HIV were linked to care within three to four months of diagnosis, and 51% were retained in ongoing care (7–10). Data from the United States-based Medical Monitoring Project found that 89% of adults  $\geq 18$  years of age receiving HIV care had been prescribed antiretroviral therapy (ART) and that 77% of these patients had VS on their last viral load test (5). The U.S. Centers for Disease Control and Prevention estimates that 28% of all persons living with HIV in the United States have VS (5).

The Pan American Health Organization/World Health Organization recommends that the HIV treatment cascade be considered a priority as a component of HIV surveillance in Latin America and the Caribbean (11). There is currently a paucity of literature on the HIV treatment cascade in Caribbean countries and other developing nations.

The goal of this report was to evaluate the continuum of HIV treatment care and support for PLHIV in the Bahamas, using consensus-based indicators. The World Health Organization (WHO) definition for VS, of a viral

load  $< 1\ 000$  copies/ml (11), was used in this study.

## METHODS

This study is a descriptive analysis of data from the Bahamas MoH for patients newly diagnosed as HIV-positive between 1 January 2014 and 31 December 2014. The study summarizes the experience and outcomes of persons newly diagnosed with HIV in 2014, with respect to their access to treatment and care and to sustaining VS.

The Bahamas MoH monitors new HIV diagnoses, ARV prescriptions, and laboratory results in the country. All HIV tests done in the public sector are reported to the MoH annually.

We recorded demographic information, such as age and sex, mean age at presentation, and mean CD4 cell count at presentation.

We used these data and constructed an HIV cascade of care for all individuals diagnosed HIV-positive in 2014 and known to be alive within a year of diagnosis.

We used consensus-based indicators to reflect the percentage of newly diagnosed HIV cases in 2014 that were linked to care, retained in care, eligible for ART, prescribed ARVs, and virally suppressed. The consensus-based indicator for the number of diagnosed cases was the number of PLHIV diagnosed and known to be alive within a year of their diagnosis. The Bahamas MoH classified individuals with one CD4 or HIV viral load (VL) measure in 2014 as linked to care. The MoH classified those with two or more CD4 counts in a year as retained in care.

In the Bahamas in 2014, PLHIV having a CD4 count  $\leq 350$  cells/mm<sup>3</sup> were eligible for ART. The study investigators also reviewed the number of PLHIV with CD4 cell counts of  $\leq 500$  cells/mm<sup>3</sup>, in keeping with the existing WHO guidelines for ART initiation at the time the study was done.

The Bahamas MoH recorded the number of PLHIV prescribed antiretroviral therapy. We defined ART adherence as filled prescriptions  $> 11$  months/year. We classified VL  $< 1\ 000$  copies/ml as suppressed. The VL analysis was done after at least six months of ART. We used the chi-square test for independence to determine statistical significance among gender and age groups.

We made comparisons in the cascade by gender and age.

The authors obtained data from the National AIDS Centre Pharmacy, laboratory records, and the MoH. We used a current version of Excel Software for Microsoft Office and Statistical Analysis Software (SAS) for data analysis and to assess frequencies of each indicator. We cross-referenced the data in the CD4/viral load database with entries in the pharmaceutical database and surveillance data set. We used probabilistic matching in Link Plus to determine matches across these databases.

## RESULTS

In total, there were 250 people diagnosed with HIV in 2014 and alive at the end of the year. Of this number, 134 (54%) were male and 116 (46%) were female. In terms of age, 4 of them (2%) were between 0 and 14 years old; 51 (20%) were between 15 and 24 years; 147 (59%) were between 25 and 49 years; and 45 (18%) were 50 years or older. Also, three individuals (1%) did not have an age recorded, and therefore could not be included in any specific age category. The mean age of this cohort was 36 years (with a standard deviation of  $\pm 14$  years). The mean CD4 count at diagnosis was 329 cells/mm<sup>3</sup> (with a standard deviation of  $\pm 392$  cells/mm<sup>3</sup>). The median CD4 count at diagnosis was 301 cells/mm<sup>3</sup>.

Of the 250 patients, 79 of them (32%) were retained in care, 116 (46%) were on ARVs, and 48 (19%) achieved VS. In terms of the CD4 counts, 194 of the patients (78%) had a CD4 count  $< 350$  cells/mm<sup>3</sup>, and 227 (91%) had a CD4 count  $< 500$  cells/mm<sup>3</sup>. Of the 116 persons prescribed ARVs, 48 of them (41%) achieved VS; 8 of the 116 (7%) had 12 consecutive drug pickups.

A higher percentage of women than men were linked to care (62% vs. 60%), were retained in care (33% vs. 31%), were on ARVs (48% vs. 45%), and achieved VS (22% vs. 16%). However, these differences were not statistically significant.

In terms of being retained in care, this was the case for 100% of those under age 14, 35% of those 15–24, 16% of those 25–49, and 33% of those 50 and over. In regards to attaining VS, this was true for 50% of those under 14, 24% of those 15–24, 16% of those 25–49, and 22% of those 50 and over. These differences

with respect to age did not reach statistical significance.

## DISCUSSION

In the Bahamas, attrition was noted at each step in the HIV treatment cascade of newly diagnosed individuals in 2014. Persons who were not engaged in care accounted for a large portion of those with detectable viremia.

At the time this study was being conducted, national ARV prescribing guidelines were based on a CD4 count of  $\leq 350$  cells/mm<sup>3</sup>. New guidelines are now in place to treat all PLHIV, regardless of the CD4 count. The current practice is to prescribe ARVs after the client has a clinical assessment and receives extensive counseling and baseline laboratory investigations. During the first year of treatment, clients are expected to have approximately six visits to the outpatient clinic, as well as monthly ARV pickups.

According to the guidelines in place at the time of the study, 194 of the 250 persons newly diagnosed with HIV (78%) were eligible for ART, but only 116 (46%) of the individuals in the study cohort were on ARVs. Low ART coverage rates are a contributing factor to the low rates of VS observed in this study.

Adherence was low, with only 8 persons out of the 116 (7%) making 12 drug pickups (that is, one per month over the year). Suboptimal ART adherence may also pose barriers to treatment outcomes. According to the Bahamas' 2012 annual HIV surveillance report, ~0.4% of patients were adherent to 12 drug pickups out of a possible 12 drug pickups in the year 2012 (12). That report also indicated that only 2.1% of patients received ARVs greater than 80% of the time.

Our study may not have assessed all the barriers that impede optimal treatment outcomes in the Bahamas. One of these additional obstacles may be low availability of HIV care services, since the country primarily has a centralized model of HIV care and treatment services.

Differences in VS rates were noted in the HIV treatment cascade related to age and gender; however, these differences were not statistically significant. Overall, more women (22%) achieved VS than did men (16%). VS was suboptimal in both groups. It has been observed that women seem less able to tolerate ART

than is true for men (13, 14). Barriers to ART adherence may include competing demands such as needs of other family members, fear of disclosure in the household, and ARV-related lipodystrophic body changes. These may be among the factors contributing to the low levels of VS seen in this study.

There were some trends in viral suppression rates related to age, but they did not attain statistical significance. For adolescents, there are many challenges related to HIV treatment, including acceptance of diagnosis, patient readiness for ART, establishing connection with clinic staff, ongoing psychosocial support, family support, transportation difficulties, comfort navigating clinics, and adherence to ART. In contrast to younger patients, older patients with HIV infection tend to be more adherent to medications, with adherence as high as 95% (15-19).

Positively impacting the HIV epidemic in the Bahamas would involve improving each aspect of the HIV treatment cascade. Part of that effort should be an analysis of indicators, in order to optimize outputs at each level. Interventions to improve linkage to care, retention in care, and adherence are needed. Efforts are being made to expand universal access to comprehensive HIV prevention, treatment, care, and support services by decentralizing and integrating these services into primary health care clinics.

Improvements in rates of viral suppression have occurred over time. VS rates increased from 8% in the cohort of patients diagnosed with HIV in the Bahamas in 2012 (20) to 19% in this current study. Overall, 41% of patients receiving ART in 2014 achieved VS, compared to 39% of patients receiving ART in 2012 (21). For the larger cohort of all PLHIV in the Bahamas who received ART in 2014 ( $n = 1\ 616$ ), the viral suppression rate was 44% (22). Other countries in the Caribbean have also observed increases in VS rates over time. In Barbados, the percentage of clients of the national HIV treatment center achieving viral suppression rose from 33.6% in 2002 to 70.3% in 2011 (22).

The Bahamas has updated its guidelines for starting ART, in an effort to scale up antiretroviral therapy coverage to people living with HIV at higher CD4 counts. HIV "test and treat" strategies were implemented in 2016. These initiatives could

increase overall community VS in the Bahamas. However, to be effective, these initiatives will need to be done in concert with initiatives to improve linkage to care, retention in care, and adherence to ART.

Among the strengths of this analysis were an accurate, detailed review of the patient cohort with respect to constructing the HIV continuum of care. The relatively small number of the patients in the cohort allowed for accurate results in terms of linkage, retention, ARV prescription, and viral suppression, without necessitating the use of modeling or other estimates.

This study was limited in that the treatment cascade analysis was performed for PLHIV in the year 2014 only. The number of patients in the study was also low ( $n = 250$ ) and may have contributed to the low *P* values attained in the statistical analyses. The data analyzed at the Bahamas MoH and its Health Information and Research Unit was limited to laboratory investigations and pharmacy data in the public health care system only. Data related to CD4, VL tests, ARV prescription, and ARV pickups generated from care in the private health care system or out of the country were not available to inform this study. It is possible that patients categorized as not engaged in care in the analysis of the treatment cascade could have been receiving care in the private health care system or out of the country. It is known that a percentage of patients in the Bahamas travel to North America for health care.

Another limitation was the use of consensus-based indicators for the construction of the cascade and the exclusion of clinic-visit data as an alternate indicator of adherence or retention in care. In total, 227 individuals in the cohort (91%) had a CD4 count or VL. Developing countries may have unique challenges related to the availability of CD4 and VL tests, including reagent stockouts or machine maintenance issues.

Patient adherence to blood investigations may also be low. In the context of the Caribbean and developing countries, challenges related to the availability of data needed to inform the HIV treatment cascade may limit the ability to construct an accurate quantitative representation of services. This is an important point to consider when analyzing

HIV treatment cascades for Caribbean nations, as well as other developing countries that may have similar challenges. Barriers contributing to attrition at each step of the HIV treatment cascade were not assessed and were beyond the scope of this quantitative review.

Additional research is needed on barriers to and factors associated with sub-optimal levels of both linkage and retention. Studies are needed on interventions to improve linkage and retention in care in developing countries. These studies should address the challenge of poor retention, taking into account multiple factors. Evidence-based

studies on barriers to adherence and interventions to improve adherence are also needed. Data are needed on the feasibility and cost of test-and-treat strategies. Comprehensive, evidence-based strategies are the next step in improving the HIV treatment cascade and in reducing the impact of the HIV epidemic in the Bahamas.

## Conclusions

Attrition occurred at each step in the HIV continuum of care in the Bahamas in 2014. Given that finding, increased effort is needed to link and retain

HIV-positive patients in care. Based on the guidelines in use in 2014, 78% of PLHIV were eligible for ART. Ongoing Bahamas Ministry of Health efforts to implement ARV scale-ups and adherence interventions are expected to yield higher rates of VS and to improve the treatment cascade.

**Conflicts of interest.** None.

**Disclaimer.** Authors hold sole responsibility for the views expressed in the manuscript, which may not necessarily reflect the opinion or policy of the *RPSP/PAJPH* or PAHO.

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**RESUMEN****El proceso continuo de atención de la infección por el VIH en las Bahamas en el 2014**

**Objetivo.** El proceso continuo de la atención de la infección por el VIH describe el espectro de intervenciones en la atención de la infección, desde el diagnóstico hasta la supresión viral. El objetivo del estudio fue elaborar un proceso continuo de la atención como punto de referencia y comparación para nuevos diagnósticos de infección por el VIH en las Bahamas en el 2014.

**Métodos.** En el proceso continuo de la atención se incluyó a personas con diagnóstico de infección por el VIH en el 2014 y que continuaban vivas a un año del diagnóstico (n = 250). Se consideró vinculadas a la atención a aquellas personas con un recuento de linfocitos CD4 o una medición de la carga viral de VIH en el 2014. Aquellas con al menos dos recuentos de CD4 en el año se consideraron retenidas en la atención. La aptitud para el tratamiento antirretroviral se basó en tener un recuento de CD4 < 350 células/mm<sup>3</sup>. Se definió adherencia al tratamiento antirretroviral como la entrega de la prescripción >11 meses/año. Se consideró supresión viral a una carga viral de < 1 000 copias/ml. Se hicieron comparaciones en las cascadas por sexo y edad.

**Resultados.** De las 250 personas que participaron en el estudio, 79 (32%) se retuvieron en la atención. Se prescribieron antirretrovirales a 116 de las 250 personas (46%); de estas 116 personas, 48 (41%) lograron la supresión viral. Las mujeres lograron la supresión viral en una proporción mayor que los hombres, pero esta diferencia no fue estadísticamente significativa. Igualmente, se observaron diferencias en la supresión viral según la edad, pero estas tampoco fueron estadísticamente significativas.

**Conclusiones.** En las Bahamas, es necesario incrementar los esfuerzos para ayudar a las personas con infección por el VIH a vincularse y mantenerse en la atención. La supresión viral puede permanecer en niveles subóptimos a menos que se amplíe el tratamiento antirretroviral y se incluyan intervenciones de adherencia terapéutica en las medidas para mejorar el proceso continuo de la atención.

**Palabras clave** VIH; continuidad de la atención al paciente; Bahamas.