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TÍTULO:

CONOCIMIENTO EN EL CUIDADO DE LA SALUD SOBRE EL VIH Y SU ASOCIACIÓN CON CARACTERÍSTICAS PSICOSOCIALES Y SUPRESIÓN VIRAL EN PVVS EN LIMA, PERÚ

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Conocimiento en el cuidado de la salud sobre el VIH y su asociación con características psicosociales y supresión viral en PVVS en Lima, Perú

Resumen:

Dentro de los factores asociados a mayor adherencia al TAR se ha estudiado principalmente el conocimiento en salud y las características psicosociales como estado de ánimo, consumo de alcohol y/o drogas, satisfacción con el centro de salud y sistema de soporte. Se conduce este estudio con la finalidad de describir el conocimiento acerca del autocuidado en salud en pacientes PVVS y determinar los principales factores que influyen en él. **Materiales y métodos:** Estudio de corte transversal en PVVS que acuden al Hospital Cayetano Heredia, Lima Perú. Participantes completaron encuesta auto administrada con preguntas relacionadas a conocimientos en autocuidado de la salud como PVVS, TB y cáncer de cérvix y de sus potenciales determinantes (tamizaje de depresión, tamizaje de riesgo de alcoholismo, uso de drogas ilícitas, sistema de soporte, satisfacción con el centro de salud y características sociodemográficas). Supresión viral se definió como dos cargas virales consecutivas menor de 50 copias/ml, los valores de carga viral se tomaron de la base de daos de la Estrategia de VIH. **Resultados:** Se analizaron datos de 191 PVVS. La muestra de estudio mostró buen nivel de conocimiento en autocuidado de la salud, uso de TAR y TB. Se halló un tercio de la muestra con depresión. Se asoció depresión como factor de riesgo para bajo conocimiento y nivel superior de educación como factor protector en modelos bivariados y multivariados. En el modelo bivariado se asoció buen conocimiento en autocuidado de la salud y TAR con supresión viral, mas no en el modelo multivariado. **Conclusiones:** Se necesita investigar el efecto de la depresión en PVVS en el conocimiento y adherencia al TAR.

Palabras claves: VIH, conocimientos, VIH/TB, Perú. Psicosocial.

Introduction

HIV treatment expansion has resulted in a 48% decline in AIDS-related deaths globally from 2005 to 2016. Despite this success, HIV is the second cause of death from an infectious disease and a slow decline in new infections may hinder efforts to control the epidemic. In 2017 1.8 million new HIV infections occurred[1]. The UNAIDS Fast Track strategy proposes ending the AIDS epidemic by 2030 by increasing coverage of tested, treated and virally suppressed, to reach 95% of all persons living with HIV, decreasing new infections to 200 000 among adults and zero discrimination.

Information on HIV care is key for patients to receive the full benefit of antiretroviral. Patient information and education increases adherence to therapy[5], empowers patients to participate in their own care[6] and reduces vertical transmission[7]. Among 339 PLWHA in Wisconsin, health literacy was significantly associated to misconceptions on HIV transmission.[8] In a study among Latino PLWHA living in the United States, 40% of participants believed a day without taking ARV allows the body to recover from the side effects[7].

Likewise, satisfaction with health services is of paramount importance for the retention of PLWHA and can impact in their health education. Studies show communication barriers and suboptimal confidentiality during medical appointments[545]. In the US, a significant difference was found between health literacy and patients reporting shared-decision making and understanding what the doctors says[48]. Poor mental health, substance abuse and heavy alcohol consumption have also been recognized as barriers to care in PLWHA and has been associated with lower adherence to ART. [28 37] Few studies have described the association of depression and substance abuse with health literacy, despite its role in adherence and retention in care.

Patients HIV-1 RNA level (the viral load) is a predictor of the time to progression to AIDS and death, independently of CD4+ cell counts and it is also an important factor in selecting an antiretroviral therapy (ART) regimen and monitoring the response and adherence to treatment.[38] The key for HIV treatment success is HIV viral load suppression by ensuring adherence to ART in HIV-infected individuals. Detectable viral loads are associated with drug resistance, increased morbidity and mortality, and a higher risk of HIV transmission. Low health literacy, depression, substance abuse and limited disclosure of HIV status have been associated with low adherence and detectable viral load [39 40]. In Lima, a study among 364 PLWHA found that satisfaction with information received on ARVs drugs was not associated with adherence,[12] however, knowledge was not measured. In 2006, 77% of PLWHA attending a referral hospital in Lima, Peru said they understood all information given by the doctors and rated well the work by psychologists and social workers. The level of knowledge in patients was not quantified.[10] A qualitative study in Piura, Peru concluded that PLWHA on ARV improve their general health but maintain sexual behavior that can facilitate HIV transmission.[11] These findings suggest knowledge gaps regarding the health care of a PLWHA. We conducted this study to describe the knowledge among PLWH on their health self-care and to explore what characteristics determine this knowledge, and the impact on viral load.

Methods

Study design, setting and population

In Peru, HIV is concentrated in high-risk populations. In 2016, there were 66 907 PLWHA, 18 965 of them in AIDS.[9] We conducted a cross-sectional study at the HIV program at a third level hospital in Lima, Peru. The hospital has a catchment area of 98948 inhabitants and provides care to the largest number of PLWHA in Peru. [13] Participants were considered eligible if they were PLWHA over 18 years old, registered in the hospital HIV program and able to provide written consent. Considering that 15% of participants would be categorized as low knowledge[7] with a total of 1580 PLWHA enrolled in the HIV program we calculated a total of 174 participants with a confidence level of 95% and a precision of 5%. Calculating that 15% would not complete the survey we enrolled 205 participants.

Study procedures

To develop the survey, we conducted a literature review of validated surveys and consulted with infectious diseases clinicians and nurses providing HIV care to develop a survey focusing on three major topics: knowledge on HIV self-care, knowledge on ART, knowledge on TB and among women living with HIV/AIDS (WLHA), knowledge on cervical cancer and pregnancy. The internal validation of the instrument was done with six PLWHA, to determine clarity, any potential discomfort created by questions or alternative responses that were not initially considered. The survey had 37 multiple-choice questions divided in four sections: 1) demographics (age, sex and type of insurance), 2) perception on quality of care and acceptability and accessibility of care (30 statements were rated in a five point Likert scale) [16] 3) 28 questions on knowledge on HIV self-care, 5 on ART knowledge, 5 on TB knowledge, 3 additional ones on cervical cancer and pregnancy for women only 4) mental health using a standardized Mental Health Inventory-5 scale (5 statements) [14] that measures psychological stress, risk of alcoholism using the CAGE questionnaire (four questions) [15], illegal drug consumption (1 question), disclosure (1 question), perceptions on psychological support received at the hospital (3 questions).

In the sample routine collection of viral load and CD4 cell count between November 2016 and July 2017 the two principal researchers invited consecutively to the potential eligible participants to participate on the study previous explanation. The patients that agreed to be part of the study, first completed the informed consent process and then were requested to answer the self-administered paper based survey.

Educational status, marital status and date of enrollment to the HIV program as well as date of ARV initiation and viral load, were subsequently extracted from the hospital records from the routine database by using a unique anonymized identifier. We choose two viral loads, the viral load of the survey day and the most proximate registered before or after the survey with a maximum of 6 months.

Data management and analysis

Data was entered in an Access database developed for the study stored on a single computer. Data was analyzed using Stata v11. We calculated percentages for categorical variables and measures of central tendency such as mean and standard deviation and median and interquartile ranges for continuous variables.

The HIV knowledge self-care section comprised 28 questions about HIV self-care, prevention and prognosis: 3 questions with 0/1 points and 25 questions with 0/0.25 points. The maximum possible score was 9.25. The ART knowledge section was composed by 4 items of 1 point and 3 items of 0.25 points, the maximum score was 4.75. The TB knowledge score was composed by three one-point items and two two-point items (full knowledge on TB symptoms and full knowledge on TB prevention full knowledge on TB prevention), with a maximum possible score of 7. For the three scores, the median was the cut-off to discriminate between high and low knowledge.

We defined unsuppressed viremia as having two consecutive viral loads with more than 50 copies in a period of 12 months. For this definition we used the viral load measured on the day of enrollment and the most proximate viral load within 6 months after or before of the survey.

To study the determinants of low knowledge for the three scores (HIV knowledge self-care, ART knowledge and TB knowledge), we studied the bivariate association for each one with potential determinants sociodemographic (sex, age, marital status and educational status), depression status (no depression, mild, moderate and severe), disclosure, perception of support from the person to whom they had disclosed, the risk of alcoholism, the use of illegal drugs and time in ART.

To study the determinants of unsuppressed viremia, we studied the bivariate association with potential determinants sociodemographic (sex, age, marital status and educational status), depression status (no depression, mild, moderate and severe), disclosure, perception of support from the person to whom they had disclosed, the risk of alcoholism, the use of illegal drugs and time in ARV therapy. We studied also HIV knowledge self-care, ARV knowledge and TB knowledge scores as potential determinants of unsuppressed viremia. We excluded from this analysis patients who did not have viral load measures 6 months before after the survey and patients who were not on ART.

We used poisson regression to calculate prevalence ratios in the bivariate and multivariate analysis.

Ethical considerations

The protocol was approved by the Institutional Review Boards of the Universidad Peruana Cayetano Heredia (SIDISI 66074) and of the Hospital Cayetano Heredia (date of approval 10/02/2016) Patients willing to participate were requested to sign a written consent and received a copy. After completing the survey they received the correct answers for the survey, developed by HIV experts. Linking of the study database and the hospital databases was done with a unique numeric ID. All study researchers were trained in responsible conduct of research.

Results

Study population and participant's characteristics

We invited 255 eligible patients to participate of which 80.4% (205/255) were enrolled. Reasons not to participate among those eligible were: 26 (10.2%) lack of time, 10 (3.9%) no reason given, 8 (3.1%) they could not read well and 6(2.4%) they were busy. Of the 205 enrolled, data was missing for 14 (6.8%). Therefore, 191 (93.2%) were included in the analysis.
Of the participants included, 53/191 (27.8%) participants were female, median age was 36 (interquartile range (IQR) 27-44), 51 (26.7%), were married or cohabiting, 7 (3.7 %) divorced, 119(62.3%) single and 12 (6.3%) widowers. Ninety five (49.7%) participants completed high school, 12 (6.3%) have primary school, 82 (42.9%) university and one (0.5%) had an unknown educational level. The median time between participant's enrollment in the HIV program and the study interview was 4.0 years [IQR, 1.5-8.6] and the median time between antiretroviral start date and the interview was 3.5 years [IQR 1.4-6.5].

Perception of accessibility and acceptability of health service and quality of care among PLWHA in a referral center in Lima, Peru (N=191)

The results for the 191 PLWHA who completed the perception of quality of care items in our survey are shown in table 1.

Disclosure and psychological support (N=167)

Of 191 PLWHA, 167(87.4%) reported that they disclosed their HIV diagnosis, 9 (4.7%) did not disclose and 15 (7.9%) did not reply. Of those disclosed (N=167), 121 (72.5%) PLWHA referred feeling supported by the person they disclosed to and 46 (27.5%) did not feel supported.

Of those 163 participants that replied the MHI5 questionnaire, when using a single cutoff: 55 (33.7%) tested positive for screening of major depression and 108 (66.3%) tested negative. When analyzing data using four categories (at cut off scores of 52, 60 and 68 out of 100) , 76 (46.6%) were not depressed, 32 (19.6%) were mild depressed, 33 (20.3%) were moderately depressed and 22 (13.5%) were severely depressed.

Alcohol and substance use (N=153)

Of those who replied to the CAGE questionnaire for alcoholism screening (N=153), 132 (86.3%) PLWHA had a low risk of alcoholism while 21 (13.7%) were at risk or high risk of alcoholism. While 12/191 (6.3%) refused to answer whether they had ever used drugs, 29/179 (16.2%) PLWHA reported illegal drug use, 15/179 (8.4%) reported using it in the past and 14/179 (7.8%) used it sometimes.

General knowledge on self- care, antiretroviral therapy and TB prevention

A total of 191 PLWHA responded to the items about HIV self-care, antiretroviral therapy and TB prevention. Tables 2-4 show the answers to the survey.

Knowledge on Cervical cancer and pregnancy among women living with HIV/AIDS in a referral center in Lima, Peru 2016-2017

Fifty three women living with HIV (WLHIV) were enrolled. Of them, 31 WLHA (58.5%) knew that HIV puts them at higher risk of cervical cancer while 3 (5.7%) considered this statement false, 11 (20.8%) did not know and 8 (15.1%) did not answer. Only 24 (45.3%) knew that they should have a Pap smear every 6 months, 12 (19%) thought that it should be performed once a year, 4 (7.5%) once a month, 4 (7.5%) once in their life and one participant (1.9%) considered it unnecessary, four participants (7.5%) did not answer. Regarding pregnancy 34 participants (64.2%) recognized that if they become pregnant, several strategies must be implemented to prevent the transmission of HIV to their child, 4 (7.6%) disagreed with this statement, 11 (20.8%) did not know and 8 (15.1%) did not answer the question.

Determinants of knowledge about HIV self-care, TB and ART

The median score on general HIV self-care knowledge was 6.75 [IQR. 5.75-7.5], range 0 to 9.25. The median for the score on knowledge on ART was 4 [IQR. 2.75-4.75] range 0 to 4.75 and the median for the score for the TB knowledge was 4 [IQR. 3-5], range 0 to 7. Tables 5-7 shows the bivariate analysis of the sociodemographic characteristics associated with HIV self-care, of the knowledge on ART and of the knowledge on TB prevention.

Determinants of viral load among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. *(N =131)*

We analyzed 131 participants whom had he 2 viral loads and are on ART. 40/131 (30.5%) patients had not achieved viral load suppression. The bivariate analysis of the association of knowledge and other potential determinates of having an unsuppressed viral load and the multivariate analysis to determine the independent association of each factor, is shown in table 6.

Discussion

Our study population had good knowledge on HIV self-care, on ART and on TB in general. Depression and age above 44 years old, was associated to low HIV self-care knowledge and ARV knowledge. Higher education was associated to high knowledge in the three subcategories (HIV self-care, ART knowledge and TB knowledge). Time from ARV and the study interview less than 6 months was associated o unsuppressed viral load. A large proportion of our study population, 33%, tested positive in a screening for major depression.

In our study population, knowledge on HIV self-care was generally high. However, we found important gaps such as the 10% that did not consider necessary to use a condom in any sexual relation with a person without HIV and 46% of respondents knew that the microbicides do not prevent HIV transmission. These are gaps in knowledge that can potentially impact HIV transmission. A study from 2003 explored HIV knowledge among 90 low income latino PLWHA and 33% of them considered the statement "While I am on ART, I do not transmit HIV" correct, as compared to 15% in our study. Likewise, 66% of the participants in that study considered the statement "It is important to discontinue ART for a few days to rest the body" correct, as compared to 74% in our study[25]. These studies were conducted 15 years apart and the socioeconomical status of the two populations was different.

We found specific gaps related to TB prevention and symptoms: 85% of respondents were unaware of TB prophylaxis and only 29% knew that TB can be asymptomatic in PLWHA. A study in South Western Ethiopia [26] among indigenous kebels, reported lower correct answers for questions on TB knowledge as compared to our study such as recognizing persistent cough for 15 days as a TB symptom (75.4% vs. 9.9%), and recognizing weight loss as a TB symptom(47.1% vs 14.7%)[27]. A US study among HIV negative and positive people found that 44% responded correctly that TB is transmitted by air around infectious TB patient as compared to 67% in our study, and only one third of the respondents in the US recognized TB as a curable illness compared with 78% from ours [44]

Cervical cancer is the leading cause of cancer death in Peruvian women and (WLHIV) are 7 times more likely to develop cervical cancer compare with uninfected women. One study on WLHIV in Lima showed that 77.5% were overdue their cancer screening and 12.7% had never had a pap smear [41]. In our study 20.8% of WLHIV did not know that being infected with HIV puts them in higher risk of cervical cancer and only 45.3% recognized that they should have a pap smear every 6 months for screening of cervical cancer. This finding supports the need of developing cervical cancer educational interventions among WLHIV. Most participants recognized that if they become pregnant they should take several measures to prevent the transmission of HIV to your child, however 7.6% of the women enrolled disagreed with this statement, which can potentially impact vertical transmission of HIV among our population.

We evaluated the role of HIV related knowledge in viral load suppression and as shown in the multivariate analysis there was no significant association between low HIV self-care knowledge, ARV knowledge and TB knowledge and viral load suppression at the time of the survey but in the bivariate analysis an association between depression, general knowledge and ARV knowledge with viral load suppression was

found. Evidence about the positive effects of HIV knowledge on the viral load suppression has been studied by Kalichman SC before[8] [33] his studies reported a significant association between low health literacy, low level of HIV related knowledge, worse ART adherence, lower CD4 cell counts, and detectable viral loads.

The proportion of PLWHA that screened positive (33%) for major depression was lower compared with previous local studies [19,] A study in Lima used the Hopkins Symptoms checklist and found a prevalence of depression of 68%among HIV-positive impoverished women . [19] [20] A systematic review of 13 studies on depression among HIV positive persons in Ethiopia using different instruments (the CES-D and the PHQ-9 were the most frequently used), found a pooled prevalence of, 37%[24] In a nationally representative large survey in the US using the University of Michigan scale, found 36% major depression among HIV persons receiving care [34] [35]. Depression has been recognized as a barrier to care and associated with lower quality of life and lower adherence to ART [21] [22] [36]. In a study using the WHO Quality of Life-HIV BREF questionnaire, quality of life was poor among all HIV patients enrolled, however depressed HIV patients had a significantly lower quality of life than their no depressed counterparts.[22] In Chile, HIV patients with moderate-severe depressive symptoms had three times higher risk of non-adherence compared to patients with mild to no depressive symptoms. [36] Further studies should assess the impact of treating depression in knowledge on HIV, adherence to care and viral suppression. The proportion of PLWHA that had disclosed their HIV status in our study was similar than that reported both in resource rich and limited countries[17] [18] . The high proportion of patients with a positive screening for major depression was unexpected and not foreseen in the study planning. As interviews were conducted anonymously, we did not inform the result of the screening to patients. However, this high proportion of major depression will be reported to the IRB at UPCH. For future studies that include screening for depression, we recommend to inform all patients about the availability of psychiatric and supportive services that they can access.

The 13% risk or high risk of alcoholism found in our study is lower compared to studies among HIV patients using the same questionnaire. In an HIV clinic in Boston USA, 42% participants had a risk or high risk of alcoholism, however, the study selected patients with higher pretest risk. [23] A study in Uganda among 1027 women with high risk sexual behavior found a prevalence of 39% of risk or high risk of alcoholism. [24]

Health providers play a very important role on HIV related knowledge as the principal educators for PLWHA [8] [10]. We found that more than 50% were unsatisfied with the waiting time for the doctor's appointment, the pickup of antiretroviral and the testing in the laboratory, factors that have been previously described in the literature specially in other low and middle income countries and has been recognized as a factor that contributes to missed visits among PLWHA.[28,29] On the other hand shortening the waiting time has been associated with an improvement in ART adherence in other setting which could be an interesting way to improve adherence to ART.[30,31] . Confidentiality was moreover well accepted by PLWHA however since lack of confidentiality has been recognized as a barrier for retention in care[32] the fact that more than 30% of participants recognized that not always confidentiality was respected should be addressed as a worrisome fact. It is important to recognize that in our settings confidentiality is hard to be protected given the fact that in one room two medical attentions are being conducted simultaneously.

Our study was limited by the fact that the score used to measure HIV, ART and TB knowledge was not formally validated. However we used validated surveys and questionnaires consulted with HIV specialists and performed a pilot study among PLWHA to minimize that limitation. Another limitation of our study is that participants were enrolled in waiting rooms for CD4 measurement which can mean that these patients are retained in care and possibly have a higher knowledge. Finally, our study participants may have been more educated than all PLHV attending the hospital, since they might have felt more comfortable replying to a questionnaire on knowledge (the more educated) compared with the PLWHA that refused to participate. Fifty percent of our study participants had completed high school which is higher than the national proportion (35%) for the same age group, as determined in the last national census. In a study among MSM and transgender women at high risk of HIV or living with HIV in Lima, 53% of participants had higher education and a cross sectional study among 417 PLWHA in Lima during 2013, 46% of participants reported higher education. [12 42 43]

Different studies have shown that depression is associated with worse adherence to treatment and impaired health status so this fact should draw considerable concern[22] These findings support that depression influence knowledge and might influence viral suppression, and we have to emphasize our work on this factor. The main goal of ART is to achieve viral suppression. The high percentage of depression and its association with low HIV and ART knowledge should warrant the development of strategies to address this significant topic.

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TABLES

Table 1. Perceived accessibility and acceptability of health service among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. (N=191)

	Always/almost always	Sometimes/ Seldom	Never	Do not answer
	n/N(%)	N(%)	N(%)	N(%)
When attending the hospital				
It is easy to reach	130 (68.1)	49 (25.7)	5 (2.6)	7 (3.7)
I pay more than I can	39 (20.42)	73 (38.2)	65 (34.0)	14 (7.3)
I pay more for what I get	35 (18.3)	66 (34.6)	69 (36.1)	21 (11.0)
The schedules are good for me	90 (47.1)	81 (42.4)	9 (4.7)	11 (5.8)
It has a stock of all medicines	144 (75.4)	34 (17.8)	5 (2.6)	8 (4.2)
Got the preferred health service	133 (69.6)	48 (25.1)	2 (1.1)	8 (4.2)
Do you wait too much for the appointment				
With the doctor	100 (52.4)	78 (40.8)	8 (4.2)	5 (2.6)
To pick antiretroviral refills	98 (51.3)	75 (39.3)	12 (6.3)	6 (3.1)
To get tests at the laboratory	97 (50.8)	73 (38.2)	13 (6.8)	8 (4.2)
The infrastructure of the locations is adequate				
At the doctor's office	95 (49.7)	79 (41.4)	13 (6.8)	4 (2.1)
At the antiretroviral dispenser	92 (48.2)	78 (40.8)	16 (8.4)	5 (2.6)
At the laboratory	98 (51.3)	73 (38.2)	13 (6.8)	7 (3.7)
Confidentiality is respected				
At the antiretroviral dispenser	128 (67.0)	54 (28.3)	7 (3.7)	2 (1.1)
At the laboratory	130 (68.1)	52 (27.2)	5 (2.6)	4 (2.1)

Table 2. General Knowledge on self-care, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=191

	Correct	Incorrect	Doesn't know	Do not answer
General knowledge				
Is HIV an illness that can be cured or controlled?	166 (86.9)	8 (4.2)	12 (6.3)	5 (2.6)
A PLWHA can live the same number of years as a person not infected?	140 (73.3)	12 (6.3)	33 (17.3)	6 (3.1)
I must use a condom in any sexual relation with a person without HIV	172 (90.1)	7 (3.7)	7 (3.7)	5 (2.6)
I am at risk of another infection if I have sex with a PLWHA without using a condom	150 (79.0)	23 (12.1)	11 (5.8)	6 (3.2)
I have to use condom if I have sex with a PLWWHA.	155 (81.2)	15 (7.9)	15 (7.9)	6 (3.1)
The use of microbicides during sex avoids HIV transmission	88 (46.3)	32 (16.8)	61 (32.1)	9 (4.7)
If I use condoms correctly I will have safe sex	163 (85.3)	11 (5.8)	10 (5.2)	7 (3.7)
I have to wash my hands after and before cooking and eating	179 (93.7)	6 (3.1)	2 (1.1)	4 (2.1)
I can eat food beyond its expiration if it looks good	148 (77.5)	21 (11.0)	15 (7.9)	7 (3.7)
I have to clean with hot water all the cooking tools	153 (80.1)	14 (7.3)	17 (8.9)	7 (3.7)
I can share shaving razors and needles,	155 (81.2)	25 (13.1)	3 (1.6)	8 (4.2)
I can share brush tooth or nail clipper	137 (71.7)	44 (23.0)	4 (2.1)	6 (3.1)
Can I drink or eat				
Tap water	140 (73.3)	32 (16.8)	13 (6.8)	6 (3.1)
Uncooked meat	164 (85.9)	10 (5.2)	9 (4.7)	8 (4.2)
Unwashed vegetables or fruit	146 (76.8)	30 (15.8)	7 (3.7)	7 (3.7)
Any medicine	141 (73.8)	27 (14.1)	14 (7.3)	9 (4.7)
Uncooked fish	124 (64.9)	41 (21.5)	19 (10.0)	7 (3.7)
Fresh eggs	85 (44.5)	67 (35.1)	31 (16.2)	8 (4.2)
Bottled water	172 (90.1)	7 (3.7)	5 (2.6)	7 (3.7)
Non pasteurized milk	78 (40.8)	70 (36.7)	35 (18.3)	8 (4.2)
HIV infection places me at higher risk of				
Cancer	82 (42.9)	35 (18.3)	65 (34.0)	9 (4.7)
Sexually transmitted infections	132 (69.5)	15 (7.9)	36 (19.0)	7 (3.7)
Diarrhea	143 (75.3)	16 (8.4)	23 (12.1)	8 (4.2)
Dental problems	90 (47.4)	32 (16.8)	58 (30.5)	10 (5.3)
I need the following vaccines				
Hepatitis B vaccine	132 (69.1)	59 (30.9)		
Influenza vaccine	117 (61.3)	74 (38.7)		
Diphtheria and tetanus vaccine	56 (29.3)	135 (70.7)		
Measles vaccine	141 (73.8)	50 (26.2)		
Yellow fever vaccine	135 (70.7)	56 (29.3)		

Table 3. Knowledge on antiretroviral among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=179

	Correct	Incorrect	Does not know	Does not answer
Knowledge on antiretroviral therapy (ART)				
The following substances interfere with ART				
Large amounts of alcohol	117 (61.6)	23 (12.1)	18 (9.5)	32 (16.8)
Marihuana	113 (59.2)	20 (10.5)	27 (14.1)	31 (16.2)
Cocaine	127 (66.8)	15 (7.9)	17 (9.0)	31 (16.3)
While I am on ART, I do not transmit HIV	136 (71.2)	19 (10.0)	14 (7.3)	22 (11.5)
If I forget to take my ART, I can take a double dose the following day	114 (59.7)	30 (15.7)	24 (12.6)	23 (12.0)
If I am feeling ok, I can discontinue ART	147 (77.0)	8 (4.2)	14 (7.3)	22 (11.5)
It is important to discontinue ART for a few days to rest the body	141 (73.8)	14 (7.3)	14 (7.3)	22 (11.5)

Table 4. Knowledge on TB scale, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=179

	Correct	Incorrect	Doesn't know	Do not answer
Knowledge related to TB				
TB is a curable illness	149 (78.0)	11 (5.8)	17 (8.9)	14 (7.3)
TB can produce the following symptoms			14 (7.3)	
Cough for 15 days or more	144 (75.4)	47 (24.6)		
Cough	22 (11.5)	169 (88.5)		
Night sweats	71 (37.2)	120 (62.8)		
Fever	76 (39.8)	115 (60.2)		
Weight loss	90 (47.1)	101 (52.9)		
TB can be asymptomatic	56 (29.3)	135 (70.7)		
TB can be transmitted by:				
Being in contact with an untreated TB patient	127 (66.5)	64 (33.5)		
Poor nutrition	100 (52.4)	91 (47.6)		
TB can be prevented by:			19 (10.0)	
Vaccination	136 (71.2)	55 (28.8)		
Good nutrition	110 (57.6)	81 (42.4)		
ARVs	39 (20.4)	152 (79.6)		
Avoiding contact with TB patients	86 (45.0)	105 (55.0)		
Taking TB prophylaxis	27 (14.1)	164 (85.9)		
It is not possible to prevent TB	188 (98.4)	3 (1.6)		
TB is cured by:			28 (14.7)	
Long treatment with multiples pills	138 (72.3)	53 (27.8)		
It cannot be cured	181 (94.8)	10 (5.2)		
Antitussive medication (cough medication)	187 (97.9)	4 (2.1)		
Without medication	189 (99.0)	2 (1.1)		
		28 (14.7)		

Table 5. Bivariate and multivariate analysis of determinant of knowledge on self-care, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=179

	High knowledge	Low knowledge	PR Crude (95%CI)	P	Adjusted PR (95%CI)
Age group				0.016	
18-27	27(60.0)	18 (40.0)	1		1
28-36	26 (55.3)	21(44.68)	1.1 (0.7-1.8)		1.3 (0.8-2.1)
37-43	25 (59.5)	17 (40.5)	1.0 (0.6-1.7)		1.2 (0.7-2.0)
≥44	15 (33.3)	30 (66.7)	1.7 (1.1-2.5)		2.0 (1.3-3.0)
Sex				0.39	
Male	68 (54.0)	58 (46.1)	1		1
Female	25 (47.2)	28 (52.8)	1.1 (0.8-1.6)		0.8 (0.6-1.2)
Marital Status				0.016	
Married or Cohabiting	22(44.0)	28 (56.0)	1		1
Divorced	2 (33.3)	4 (66.7)	1.1 (0.7-1.8)		0.8 (0.5-1.5)
Single	63 (56.7)	48 (43.2)	1.0 (0.6-1.7)		0.8 (0.6-1.2)
Widowers	6 (50.0)	6 (50.0)	1.7 (1.1-2.5)		0.9 (0.5-1.7)
Educational status				0.000	
Primary School	7 (53.8)	6 (46.2)	0.7 (0.4-1.4)		0.6 (0.3-1.2)
High School	33(37.1)	56 (62.9)	1		1
Superior Education	53(68.8)	24 (31.2)	0.5 (0.3-0.7)		0.5 (0.3-0.7)
Mental health scale by MHI-5				0.01	
Not Depressed	55(73.3)	20(26.7)	1		1
Mild Depressed	16(51.5)	15(48.4)	1.8 (1.1-3.1)		1.5 (0.9-2.6)
Moderate Depressed	9(28.1)	23(71.9)	2.7 (1.74.2)		1.8 (1.2-2.9)
Severe Depressed	6(27.3)	16(72.7)	2.7 (1.7-4.3)		2.3 (1.4-3.7)
Did not answer	7(36.8)	12(63.2)	2.4 (1.4-3.9)		2.9 (1.5-5.5)
Alcoholism screening risk by CAGE				0.9	
No Abuse	67(52.3)	61(47.7)	1		1
Risk Abuse	10(47.6)	11(52.4)	1.1 (0.7-1.7)		1.0 (0.7-1.7)
Did not answer	16(53.3)	30(16.8)	1.0 (0.6-1.5)		0.7 (0.4-1.3)
Use of illegal drugs				0.96	
Used in the past	7(53.9)	6(46.1)	0.8 (0.4-1.6)		0.9 (0.4-2.0)
Sometimes	8(61.5)	5(38.5)	0.9 (0.5-1.7)		0.7 (0.4-1.1)
Never used	75(51.0)	72(49.0)	1		1
Did not answer	3(50.0)	3(50.0)	1.0 (0.4-2.3)		0.6 (0.2-1.4)
Disclosure of HIV diagnosis				0.11	
Almost one	83(51.9)	77(48.1)	1		1
No one	4(50.0)	4(50.0)	1.0 (0.5-2.1)		1.0 1.1 (0.4-2.0)
Did not answer	6(54.6)	5(45.5)	0.9 (0.5-1.8)		1.4 (0.7-2.8)
Self-perception of support among those disclosing				0.90	
Almost one	61(52.6)	55(47.4)	1		*
No one	26(50.0)	26(50.0)	1.0 (0.8-1.5)		
Did not answer	6(54.6)	5(45.5)	1.0 (0,5-1.8)		
Time from ARV and the study interview (in years)				0.05	
No ART	9(64.3)	5(35.7)	0.8 (0.4-1.9)		1.2 (0.4-3.6
<0.5	4(26.7)	11(73.3)	1.7 (1.005-3.0)		2.1 (0.7-6.0)
0.51-1.5	17(60.7)	11(39.3)	0.9 (0.5-1.8)		1.3 (0.4-4.0)

	1.51-3.5	20(50.0)	20(50.0)	1.2 (0.7-2.0)	1.1 (0.4-2.9)
	3.51-6.5	20(45.5)	24(54.6)	1.2 (04-1.9)	1.4 (0.6-3.2)
	>6.51	23(60.5)	15(39.5)	1	1
Time from enrollment to the HIV program and the study interview (in years)				0.39	
	0-0.5	7(46.7)	8(53.3)	1.2 (0.7-1.9)	0.8 (0.3-2.2)
	0.51-1.5	16(61.5)	10(38.5)	1.4 (0.9-2.1)	0.7 (0.3-2.0)
	1.51-4.0	21(44.7)	26(55.3)	0.9 (0.5-1.7)	1.5 (0.7-3.7)
	4.01-8.6	24(49.0)	25(51.0)	1.3 (0.7-2.4)	1.0 (0.5-2.0)
	>8.6	25(59.5)	17(40.5)	1	1

Legend: MHI-5: Mental Health Inventory-5 ARVs: Antiretroviral
*omitted because of collinearity

Table 6. Bivariate and multivariate analysis of determinants of antiretroviral (ARV) knowledge, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=179

	High knowledge	Low knowledge	PR Crude (95%CI)	P	Adjusted PR (95%CI)
Age groups				0.04	
18-27	29 (64.4)	16 (35.6)	1		1
28-36	27 (57.5)	20 (42.6)	1.2 (0.7-2.0)		1.4 (0.8-2.3)
37-43	22 (52.4)	20 (47.6)	1.3 (0.8-2.2)		1.7 (1.0-3.1)
≥44	19 (42.2)	26 (57.8)	1.6 (1.01-2.6)		1.9 (1.1-3.1)
Sex				0.107	
Male	73 (57.9)	53 (42.1)	1		1
Female	24 (45.3)	29 (54.7)	1.3(0.9-1.8)		0.7 (0.5-1.1)
Marital Status				0.019	
Married or Cohabiting	22 (44.0)	28 (56.0)	1		1
Divorced	2 (33.3)	4 (66.7)	1.2 (0.6-2.2)		1.0 (0.5-1.9)
Single	70 (63.1)	41 (36.9)	0.7 (0.5-0.9)		0.7 (0.5-1.0)
Widowers	3 (25.0)	9 (75.0)	1.3 (0.9-2.1)		1.8 (1.1-3.0)
Educational status				0.006	
Primary School	5(38.5)	8(61.5)	1.1 (0.7-1.8)		0.7 (0.4-1.1)
High School	40(44.9)	49(55.1)	1		1
Superior Education	52(67.5)	25(32.5)	0.6 (0.4-0.85)		0.6 (0.4-0.9)
Mental health scale by MHI-5				0.001	
Not Depressed	50(66.7)	25(33.3)	1		1
Mild Depressed	20(64.5)	11(35.5)	1.1 (0.6-1.9)		0.8 (0.4-1.5)
Moderate Depressed	8(25.0)	24(75.0)	2.3 (1.5-3.3)		1.9 (1.2-2.9)
Severe Depressed	13(59.1)	9(40.9)	1.2 (0.7-2.2)		0.9 (0.5-1.6)
Did not answer	6(31.6)	13(68.4)	2.1 (1.3-3.2)		2.1 (1.3-3.5)
Alcoholism screening risk by CAGE				0.84	
No Abuse	70 (54.7)	58 (45.3)	1		1
Risk Abuse	10 (47.6)	11 (52.4)	1.2 (0.7-1.8)		1.2 (0.7-1.9)
Did not answer	17(56.7)	13(43.3)	1.0 (0.6-1.5)		0.6 (0.3-1.2)
Use of illegal drugs				0.162	
Used in the paste	5(38.5)	8(61.5)	1.1 (0.6-2.0)		1.2 (0.6-2.3)
Sometime	7(53.9)	6(46.2)	1.4 (0.9-2.3)		1.4 (0.8-2.4)
Never used	83(56.5)	64(43.5)	1		1
Did not answer	4(33.3)	3(50.0)	1.5 (0.8-2.8)		1.4 (0.5-3.6)
Disclosure of HIV diagnosis				0.977	
Almost one	88(55.0)	72(45.0)	1		1
No one	3(37.5)	5(62.5)	1.4 (0.8-2.4)		1.2 (0.4-4.0)
Did not answer	6(54.6)	5(45.5)	1.0 (0.5-2.0)		0.8 (0.3-2.1)
Self-perception of support among those disclosing				0.98	
Almost one	63(54.3)	53(45.7)	1		*
No one	28(53.9)	24(46.2)	1.0 (0.7-1.4)		
Did not answer	6(54.6)	5(45.5)	1.0 (0.5-2.0)		
Time from ARV and the study interview (in years)				0.107	
No ART	5(35.7)	9(64.3)	1.7 (0.9-3.1)		2.5 (0.9-6.9)
0-0.5	6(40.0)	9(60.0)	1.6 (0.8-3.0)		1.6 (0.6-4.2)
0.51-1.5	18(64.3)	10(35.7)	0.9 (0.5-1.9)		1.8 (0.7-4.8)
1.51-3.5	23(57.5)	17(42.5)	1.2 (0.6-2.0)		1.7 (0.7-4.0)
3.51-6.5	23(52.3)	21(47.7)	1.3 (0.7-2.3)		1.9 (0.9-4.1)

	>6.51	22(57.9)	16(42.1)	1	
Time from enrollment to the HIV program and the study interview (in years)					0.019
	0-0.5	4(26.7)	11(73.3)	1.1 (0.7-1.9)	0.8 (0.4-1.4)
	0.51-1.5	17(65.4)	9(34.6)	1.1 (0.7-1.8)	1.0 (0.5-2.1)
	1.51-4.0	26(55.3)	21(44.7)	0.8 (0.4-1.6)	0.7 (0.3-1.6)
	4.01-8.6	25(51.0)	24(49.0)	1.8 (1.09-2.9)	0.8 (0.4-1.47.2)
	>8.61	25(59.5)	17(40.5)	1	1

Legend: MHI-5: Mental Health Inventory-5 ARVs: Antiretrovirals
*omitted because of collinearity

Table 7. Bivariate and multivariate analysis of determinant of Tuberculosis (TB) knowledge, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=179

	High knowledge	Low knowledge	PR Crude (95%CI)	p	Adjusted PR(95%CI)
Age group				0.45	
18-27	32(71.1)	13(28.9)	1		1
28-36	29(61.7)	18(38.3)	1.3 (0.7 – 2.4)		1.6 (0.8-2.9)
37-43	28(66.7)	14(33.3)	1.2 (0.6 – 2.2)		1.4 (0.7-2.8)
≥44	28(62.2)	17(37.8)	1.3 (0.7-2.4)		1.3 (0.7-2.4)
Sex				0.56	
Male	84(66.7)	42(33.3)	1		1
Female	33(62.3)	42(70.4)	1.1 (0.7-1.7)		1.1 (0.7-1.8)
Marital Status				0.60	
Married or Cohabiting	33(66.0)	17(34.0)	1		1
Divorced	3(50.0)	3(50.0)	1.5 (0.6-3.6)		1.7 (0.6-4.6)
Single	74(66.7)	37(33.3)	1.0 (0.6-1.6)		1.0 (0.6-1.6)
Widowers	7(58.3)	5(41.7)	1.2 (0.6-2.7)		0.9 (0.4-2.1)
Educational status				0.015	
Primary School	11(84.6)	2(15.4)	0.3 (0.0-1.3)		0.3 (0.1-1.1)
High School	49(55.1)	40(44.9)	1		1
University	57(74.0)	20(26.0)	0.6 (0.4-0.9)		0.6 (0.3-0.9)
Mental health scale by MHI-5				0.007	
Not Depressed	57(76.0)	18(24.0)	1		1
Mild Depressed	17(54.8)	14(45.2)	1.9 (1.1-3.3)		1.5 (0.9-2.8)
Moderate Depressed	16(50.0)	16(50.0)	2.1 (1.2-3.5)		1.7 (0.9-3.0)
Severe Depressed	14(63.6)	8(36.4)	1.5 (0.8-3.0)		1.1 (0.6-2.1)
Did not answer	13(68.4)	6(31.6)	1.3 (0.6-2.9)		1.5 (0.7-3.6)
Alcoholism screening risk by CAGE				0.082	
No Abuse	84(65.6)	44(34.4)	1		1
Risk Abuse	10(47.6)	11(52.4)	1.5 (0.9-2.4)		1.5 (0.9-2.5)
Did not answer	23(76.7)	7(23.3)	0.7 (0.3-1.4)		0.7 (0.3-1.5)
Use of illegal drugs				0.118	
Used in the past	6(46.2)	7(53.9)	0.7 (0.2-1.8)		0.7 (0.3-21.8)
Sometimes	10(76.9)	3(23.1)	1.5 (0.9-2.7)		1.2 (0.7-2.1)
Never used	96(65.3)	51(34.7)	1		1
Did not answer	5(83.3)	1(16.7)	0.5 (0.1-2.9)		0.4 (0.1-2.2)
Disclosure of HIV diagnosis				0.72	
Almost one	105(65.6)	55(34.4)	1		1
No one	4(50.0)	4(50.0)	1.5 (0.7-3.0)		0.9 (0.5-1.7)
Did not answer	8(72.7)	3(27.3)	0.8 (0.2-2.1)		1.3 (0.5-3.7)
Self-perception of support among those disclosing				0.646	
Almost one	76(65.5)	40(34.5)	1		
No one	33(63.5)	19(36.5)	1.1 (0.7-1.6)		
Did not answer	8(72.7)	3(27.3)	0.8 (0.3-2.1)		*
Time from ARV and the study interview (in years)				0.047	
No ART	10(71.4)	4(28.6)	0.6 (0.2-1.4)		0.6 (0.2-2.0)
0-0.5	7(46.7)	8(53.3)	1.1 (0.6-2.0)		0.7 (0.2-2.0)
0.51-1.5	20(71.4)	8(28.6)	0.6 (0.3-1.2)		0.6 (0.2-2.1)
1.51-3.5	29(72.5)	11(27.5)	0.7 (0.4-1.2)		0.7 (0.2-2.2)

3.51-6.5	30(68.2)	14(31.8)	0.5 (0.3-0.99)		0.4 (0.2-1.3)
>6.51	21(55.3)	17(44.7)	1		1
Time from enrollment to the HIV program and the study interview (in years)				0.8	
0-0.5	8(53.3)	7(46.7)	0.7 (0.4-1.3)		1.1 (0.4-3.0)
0.51-1.5	18(69.2)	8(30.8)	0.8 (0.4-1.4)		1.0 (0.4-2.9)
1.51-4.0	33(70.2)	14(29.8)	0.8 (0.4-1.5)		1.0 (0.3-3.2)
4.01-8.6	33(67.3)	16(32.7)	1.1 (0.6-2.2)		1.5 (0.5-4.4)
>8.61	25(59.5)	17(40.5)	1		1

Legend: MHI-5: Mental Health Inventory-5 ARVs: Antiretroviral
* omitted because of collinearity

Table 8. Bivariate and multivariate analysis of determinant of viral load, among people living with HIV/AIDS in a referral center in Lima, Peru, 2016-2017. N=131

	VL<50 (0)	VL>50 (1)	PR Crude (95%CI)	p	Adjusted PR (95%CI)
Knowledge on self care				0.03	
High (0)	53(77.9)	15(22.1)	1		1
Low (1)	38(69.5)	25(39.7)	1.8 (1.04-3.1)		1.6 (0.8-3.1)
ARVs Knowledge				0.035	
High (0)	55(77.5)	16(22.5)	1		1
Low (1)	36(60.0)	24(40.0)	1.8 (1.049-3.0)		1.7 (0.9-3.2)
TB Knowledge				0.98	
High (0)	59(69.4)	26(30.6)	1		1
Low (1)	32(69.6)	14(30.4)	1.0 (0.6-1.7)		0.7 (0.4-1.2)
Age Group				0.87	
18-27	17(63.0)	10(37.0)	1		1
28-36	24(64.9)	13(35.1)	0.9 (0.5-1.8)		0.7 (0.4-1.5)
37-43	26(76.5)	8(23.5)	0.6 (0.3-1.4)		0.5 (0.2-1.5)
>=44	24(72.7)	9(27.3)	0.7(0.3-1.6)		0.7 (0.4-1.2)
Sex				0.86	
Male	65(69.9)	28(30.1)	1		1
Female	26(68.4)	12(31.6)	1.0 (0.6-1.8)		1.0 (0.5-2.1)
Marital Status				0.92	
Married or Cohabiting	27(67.5)	13(32.5)	1		1
Divorced	3(100.0)	0(0)	1		1
Single	52(66.7)	26(33.3)	1.0 (0.6-1.8)		1.5 (0.7-2.9)
Widowers	9(90.0)	1(10.0)	0.3 (0.0-2.1)		0.4 (0.1-2.6)
Educational status				0.391	
Primary School	6(85.7)	1(14.3)	0.4 (0.1-2.6)		0.4 (0.1-2.1)
High School	43(65.2)	23(34.9)	1		1
University	42(72.4)	16(27.6)	0.8 (0.5-1.3)		1.1 (0.6-1.9)
Mental health scale by MHI-5				0.031	
Not Depressed	41(75.9)	13(24.1)	1		1
Mild Depressed	18(78.3)	5(21.7)	0.9 (0.4-2.2)		0.8 (0.3-2.0)
Moderate Depressed	13(52.0)	12(48.0)	2.0 (1.1-3.7)		2.2 (0.9-5.1)
Severe Depressed	9(64.3)	5(35.7)	1.5 (0.6-3.5)		0.8 (0.3-2.6)
Did not answer	10(66.7)	5(33.3)	1.4 (0.6-3.3)		0.5 (0.2-1.8)
Alcoholism screening risk by CAGE				0.057	
No Abuse	64(71.9)	25(28.1)	1		1
Risk Abuse	8(50.0)	8(50.0)	1.8 (1.0-3.2)		1.5 (0.7-3.1)
Did not answer	19(73.1)	7(26.9)	1.0 (0.5-2.0)		1.8 (0.2-1.8)
Use of illegal drugs				0.453	
Used in the past	6(60.0)	4(40.0)	1.1 (0.4-3.0)		1.5 (0.5-4.1)
Sometimes	6(66.7)	3(33.3)	1.4 (0.6-3.1)		2.1 (0.7-6.0)
Never used	75(70.8)	31(29.3)	1		1
Did not answer	4(66.7)	2(33.3)	1.1 (0.4-3.7)		2.6 (0.5-13.2)
Disclosure of HIV diagnosis				0.06	
Almost one	83(69.8)	36(30.3)	1		1

No one	1(33.3)	2(66.7)	2.2 (0.9-5.1)		1.1 (0.3-4.3)
Did not answer	7(77.8)	2(22.2)	0.7 (0.2-2.6)		0.7 (0.2-2.4)
Self-perception of support among those disclosing				0.555	
Almost one	56(67.5)	27(32.5)	1		1
No one	28(71.8)	11(28.2)	0.9 (0.5-1.6)		1.1 (0.3-4.3)
Did not answer	7(77.8)	2(22.2)	0.7 (0.2-2.4)		0.7 (0.2-2.4)
Time from ARV and the study interview (in years)				0.1492	
0-0.5	3(25.0)	9(75.0)	3.45 (1.5-8.0)		3.7 (1.1-12.3)
0.51-1.5	17(77.3)	5(22.7)	1.0 (0.3-3.1)		2.5 (0.6-9.8)
1.51-3.5	27(71.1)	11(28.9)	1.3 (0.5-3.4)		3.1 (1.0-9.8)
3.51-6.5	26(72.2)	10(27.8)	1.3 (0.5-3.3)		1.9 (0.7-5.0)
>6.51	18(78.3)	5(21.7)	1		