

## **Analysis and Evaluation About The Effect Of ARV Resistance Treatment In An Giang Province**

Phạm Thị Thu Hường<sup>1</sup> and Trần Thị Ngọc Giàu<sup>2</sup>  
<sup>1,2</sup>An Giang University, An Giang province, Vietnam.  
<sup>1</sup>ptthuong@agu.edu.vn; <sup>2</sup>ttngiau@agu.edu.vn

### **Abstract**

The article aims to analyze and evaluate the effect of ARV resistance treatment in An Giang province. A cross-sectional study of 126 patients in a total of 217 patients who acquired ARV drug resistance in An Giang province was conducted. The results showed that time from the beginning of ARV treatment to drug resistance for patients in compliance group is longer than patients in non-compliance group (average resistance time for patients in compliance group is 6,03 (years) and for patients in non-compliance group is 2,2 (years)). The CD4 cells increase from 129 cell/mm<sup>3</sup> before resistance to 456 cell/mm<sup>3</sup> after resistance treatment (P - value < 0,0001). After receiving ARV drug resistance treatment, patients have virus load from 0 to 200 copies/mL accounted for 93,3% and from 200 to 1000 copies/mL accounted for 6,7%. The patients highly valued the support of the medical center for treatment and health care services. Finally, recommendations for avoiding drug resistance of HIV patients are also presented in this article.

Key words: HIV/AIDS disease; ARV treatment; Drug resistance; Viral Load; CD4 cell counts.

### **Introduction**

An Giang is the most populous province in Mekong delta region with more than 2 million people. This province has a borderline of nearly 100km adjacent to Cambodia. Besides the advantages of developing border trade, the activities to prevent and control of HIV/AIDS have to face with many difficulties and complexities. In An Giang, until September 30<sup>th</sup>, 2016, there are 10,914 people infected with HIV; including 8,558 people turning to AIDS in the whole province. Currently, the province has 4,485 people being treated with ARV drugs. There are 457 people on methadone treatment and 3840 people are on first-line treatment and 217 people are on second-line treatment. The number of cases is mainly concentrated in Tan Chau precinct, Chau Phu precinct, Chau Doc city and Long Xuyen city of An Giang province (Web-1, Web-5, Web-6).

ARV has been the most effective drug to treat HIV/AIDS. Antiretroviral therapy could minimize and prevents viral replication, restores immune system, reduces the incidence and mortality of HIV-related diseases to improve health and prolong the life time (Kiertiburanakul et al., 2014 and Nguyen et al., 2013). In the Vietnamese Ministry of Health's guidelines for HIV/AIDS treatment, when antiretroviral-

resistant patients with first-line treatment are transferred to second-line treatment (Jeong et al., 2016, Web-2, Web-3). These patients have to pay five times higher than first-line treatment. With high-level treatment, patients will be physically exhausted, with a high risk of opportunistic infections accompanied by many adverse health effects. In addition, if the HIV virus is resistant to the currently treated drug, it will cause many difficulties for the treatment process (Ellen et al., 2014, Web-7, Web-8).

The goal of Vietnamese national strategy for HIV/AIDS disease is to achieve the rate of 90-90-90 by 2020 and move towards ending AIDS by 2030 (Web-4, Web-8). So, we would like to evaluate the ability of control low viral load at medical centers in An Giang province. In this study, we evaluate the treatment effectiveness for patients with first-line ARV resistance, including the following factors: adherence to antiretroviral therapy before and after drug resistance; viral load and CD4 cell count before and after resistance, support from the medical center for adherence to medication and health care for patients.

## Methods

A cross-sectional study of 126 patients who are first-line ARV drug resistance in An Giang province from September to November 2018 was conducted. Patients were interviewed directly at the medical centre. Moreover, the health information of the patients was collected in the medical records.

### Sample Size and Data Collection

Based on data reported from An Giang HIV/AIDS prevention and control center, the total number of first-line ARV resistant patients who are receiving second-line ARV treatment by September 2018 is 217 patients. A total of 126 patients were randomly selected in the research.

The questionnaire was prepared and takes about 15 minutes to complete with the following information:

1. The patients' information about: gender, age, education level, occupation, income, marital status, distance from the place of residence to the treatment center.
2. Variable compliance with ARV treatment, including 3 main factors: taking medication on time and at the right dose; re-examination on the right day; on time testing.
3. Factors from family, friends, colleagues, health facilities and the community.
4. Open questions about patients' difficulties during the treatment.
5. Information about viral load and CD4 cell count at the time of first-line ARV resistance and at present from the patient's medical record.

### Manage and Analyze Data

Participants are completely voluntary and have the right to refuse to answer questions if they do not want to answer. The data collection and the process of interview are managed by code to ensure the participants' confidentiality. The interview process and the patient information are completely confidential and only used for research purposes.

Data is cleaned and analyzed by SPSS 23.0 software. Risk factors were evaluated through descriptive statistics. Use Kaplan Meier analysis was used for compliance variables. For

continuous variables, moderate, median and 95% confident interval were presented.

## Results and Discussion

A total of 126 patients who are first-line

### Description Of Data

ARV-resistant patients and receiving second-line ARV treatment agreed to participate in the study. The description of data is presented in Table 1. In descriptive statistical results for sex and age variables, there are 48 female patients accounting for 38.1% and 78 male patients accounting for 61.9%. The median age is 41 years old, ranging from 17 to 67 years old. In terms of occupation, the number of self-employed patients accounted for the highest proportion with 60.3% of the sample; the number of non-occupational patients (without income) accounts for approximately 17% and the proportion of workers and employees accounts for 13.5%.

**Table 1.** The patients' information

Data description	Total n (%)
<b>Gender</b>	
Male	78 (61,9%)
Female	48 (38,1%)
<b>Age</b>	
17-25	11 (8,7 %)
26-35	17 (13,5 %)
36-67	97 (77 %)
	Median: 41 (years old)
<b>Academic level</b>	
Illiteracy	17 (13,5 %)
Primary school	34 (27 %)
Secondary school	56 (44,4 %)
High school	13 (10,3 %)
College/ University	6 (4,8 %)
<b>Occupation</b>	
Civil servant	6 (4,8 %)
Worker	11 (8,7 %)
Farmer	11 (8,7 %)
Freelancer	76 (60,3 %)
No job	22 (17,5 %)
<b>Income</b>	
≤ 1 million VND ( ~ 50 USD)	21 (16,7 %)
From 1 to 3 million VND (50-150 USD)	46 (36,5 %)
From 3 to 5 million VND (150-250 USD)	42 (33,3 %)
≥ 5 triệu ( ~ 250 USD)	17 (13,5 %)
<b>Marital status</b>	
Single	24 (19 %)
Marriage	60 (47,6 %)

Divorced	18 (14,3 %)
Widow	19 (15,1 %)
<b>Living with others</b>	
Living alone	15 (11,9 %)
Living with others	111 (88,1 %)
<b>Distance of residence</b>	
Median	20 Km
95% CI	(25,33 Km; 42,54 Km)
Minimum	1 Km
Maximum	200 Km

In terms of income, the proportion of patients with incomes below 5 million VND/month (250 USD/month) accounted for 86.5% and over 5 million VND/month (250 USD/month) accounted for 13.5%. There are 84.9% of the sample having education at the secondary, primary and illiteracy levels and 15.1% at high school, college and university levels. Regarding family factors, 88.1% of HIV patients live with others and only 11.9% of patients live alone. The median distance from home to the medical center of the sample is 20km.

### The Effect of ARV Resistance Treatment

To evaluate the effect of ARV resistance treatment, we listed four groups of variables which effect first-line resistance ARV treatment including: adherence to ARV therapy; viral load and CD4 cell count; clinical level and support from medical center. These variables are analyzed before and after ARV resistance treatment.

### Adherence To ARV Therapy

Adherence to ARV therapy is a major risk factor leading to failure of ARV treatment (Byrd et al., 2019, Günthard et al., 2016 and Rangarajan et al., 2014). In this section, we present the proportion of ARV adherence between compliant group and non-compliant group at first-line ARV treatment and second-line ARV treatment. In addition, the impact of ARV adherence on drug resistance

The rate of adherence to ARV treatment for patients is presented in Table 2. The results show that in the sample of first-line ARV patients, the number of non-compliant patients accounted for a very high rate of 70,2 %. However, after being transferred to second-line ARV treatment, the compliant level is 100%.

This result is due to the support and prompting from the medical team and the staff of the clinic. Moreover, when patients were resistant with first-line ARV treatment, they understood the importance of the adherence to ARV treatment.

Table 2. Descriptive statistics for adherence to ARV treatment variable

	Percentage(%)	
Adherence to ARV at first-line ARV treatment	29,8 %	<b>95% CI</b> (21 %; 38 %)
Compliant group	70,2 %	
Non-compliant group		
Adherence to ARV at second-line ARV treatment	100 %	
Compliant group	0 %	
Non-compliant group		

to assess the impact of ARV adherence on drug resistance in this group of patients, we compared the duration of drug resistance (starting from the time when the patient received ARV treatment to the time when patient was resistant with first-line ARV). The results show in Table 3.

Table 3. The average for drug resistance time

The average for drug resistance time		
	Average	95% Confidence Interval
Population	3,22 (years)	(2,69 years; 3,75 years)
Compliant group	6,03 (years)	(5,06 years; 7 years)
Non-compliant group	2,2 (years)	(1,73 years; 2,67 years)

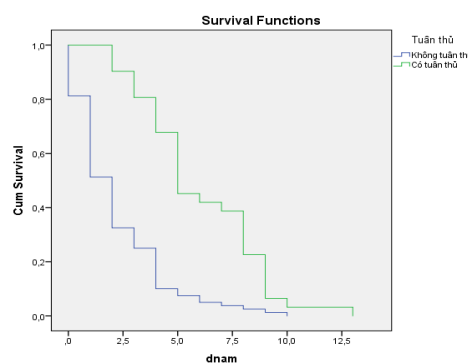


Figure 1: Kaplan Meier analysis for compliance variable

From the results in Table 3, it was found that the average duration of drug resistance for the compliance treatment group was up to 6.03 years, for the non-compliant treatment group was only 2.2 years. Combined with the results in Figure 1, it is confirmed that compliance with ARV treatment will prolong the duration of drug resistance for patients. The results are the same on the CD4 cell count (Table 4). At the first-line resistant ARV time, the CD4 cell counts in compliant group was higher than the CD4 cell counts in non-compliant group with p-value = 0,016.

Table 4. The effect of compliance variable on CD4 cell count

CD4 cell count at CD4 at the time of resistance	Percentage (%)	
Compliant group	167,12 (cells/mm <sup>3</sup> )	P-value 0,016
Non-compliant group	115,15 (cells/mm <sup>3</sup> )	

In conclusion, the compliance of treatment has a great influence on the resistance of patients and their health status. Therefore, at medical clinic of An Giang general hospital, medical staff and doctors are very focused on supporting and reminding adherence to ARV therapy for HIV patients, especially for patients who acquired second-line ARV drug resistance.

### The Medical Facility Supports

A major factor affecting the effectiveness of resistance therapy is the support of medical facilities from the An Giang general hospital. In order to assess the support of medical facilities during the treatment of HIV patients, we rely on 4 levels of patient ratings which are level 1: not interested, level 2: less interested, level 3: interested and level 4: very interested. The average rating value of the reminding support for adherence to ARV treatment and medical facilities are shown in Table 5.

Table 5. Average assessment of the support factors of medical facilities from An Giang medical clinic

	Average	95% CI
The support of reminding adherence	3,95	(3,89; 4,01)

to ARV therapy from An Giang HIV medical clinic		
The support of medical facilities from An Giang HIV medical clinic	3,85	(3,74; 3,96)

From Table 5, results show that patients highly appreciate the support from the medical centre on adherence to ARV treatment and health care in the process. The averages of their assessment of reminding adherence and medical facilities are 3.95 out of 4 and 3.85 out of 4 respectively.

### Viral Load, Cd4 Cell Count And Degree Of Clinical Manifestations

We present and compare the CD4 cell counts at the time patients were resistant with the first-line ARV treatment with the CD4 cell count when patients received the ARV resistance therapy in Table 6. The current viral load and the patient's clinical level at second-line ARV drug resistance treatment are also presented in this table.

Table 6. Viral load and CD4 cell count before and after resistance

	Average (95% CI)	P-value
CD4 before resistance	129 (105;153)	<0,0001
CD4 after resistance	456 (403;509)	
Viral load of HIV (Copies/ml)	83 (93,3 %)	
- From 0 to 200 (copies/ml)	6 (6,7 %)	
- From 200 (copies/ml) to 1000 (copies/ml)		
Clinical status (after resistance)	Discharged	

From Table 6, the average number of CD4 cells increased from 129 cells / mm<sup>3</sup> before resistance to 456 cells / mm<sup>3</sup> after resistance (P - value <0.0001). The number of patients with viral load from 0 to 200 copies/ml was 83 (93.3%), from 200 to 1000 Copies/ml was 6 (6.7%). Thus, HIV viral load has been controlled less than 10% among patients with drug resistance. This results show great potential for controlling 90% of HIV patients having low

viral load under 200 copies/ml at An Giang HIV medical clinics.

### **Conclusion**

The findings from this study have provided several contributions to the current literature. First, the support from the medical centre and counsellors about patient care service and guiding patients to comply with the treatment has a great influence on self-aware of how to prevent and cure diseases for themselves. Medical staff have a lot of experiences in treating HIV / AIDS patients because of having good relationships with patients through counselling times. They could detect patients' barriers, assess patients' adherence. These factors have positive impact on enhancing the patient's compliance. At the same time, this can reduce the spread of HIV virus in the community.

Second, a group of patients with good adherence to treatment will have a longer duration of resistance compare to the non-compliance group at the HIV/AIDS outpatient clinic of An Giang general hospital. Good adherence to treatment will control viral load and opportunistic infection. Low HIV viral load below the detection level will help HIV patients stay healthy and reduce the risk of HIV transmissions. The rate of first-line ARV drug resistance is relatively low. In December 30<sup>th</sup>, 2018, the clinic had 843 patients under treatment at level 1, accounting for 843 out of 1022 patients is 82.48% (reported from An Giang HIV / AIDS prevention centre). This shows that the first-line ARV resistance treatment in the clinic is highly effective, reaching the goal of 90% of those receiving ARV treatment about controlling low and stable viral load. This is an important indicator to assess the quality of treatment effectiveness of the clinic as well as good adherence to treatment of patients.

Regularly assess the compliance level of each patient and monitor periodically patients' health indicators are very important for HIV prevention campaign in An Giang. Adherence to ARV treatment and good control of HIV viral load in the blood will help reduce the patient's

ability to infect. Therefore, patients who have early access to ARV and comply with their treatment will improve treatment effectiveness and quality of life. This could bring benefits to HIV prevention and contribute to controlling HIV infection rates in the community.

### **Acknowledgment**

The research team would like to thank the medical staff at the HIV / AIDS outpatient clinic of An Giang general hospital for facilitating patient interviews and actively support in the interview process.

### **References**

- Byrd, K., et al. (2019). Adherence and Viral Suppression Among Participants of the Patient-centered Human Immunodeficiency Virus (HIV) Care Model Project: A Collaboration Between Community-based Pharmacists and HIV Clinical Providers. *Clinical Infectious Diseases*.
- Ellen, J. M., et al. (2014). HIV viral load levels and CD4+ cell counts of youth in 14 cities. *AIDS (London, England)*, 28(8), 1213.
- Günthard, H. F., et al. (2016). Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2016 recommendations of the International Antiviral Society–USA panel. *Jama*, 316(2), p. 191-210.
- Jeong, S. J., et al. (2016). Late presentation into care of HIV disease and its associated factors in Asia: results of TAHOD. *AIDS research and human retroviruses*, 32(3), p. 255-261.
- Kiertiburanakul, S., et al. (2014). Trends of CD4 cell count levels at the initiation of antiretroviral therapy over time and factors associated with late initiation of antiretroviral therapy among Asian HIV-positive patients. *Journal of the International AIDS Society*, 17(1), p. 18804.
- Nguyen, D.B., et al. (2013). *Outcomes of antiretroviral therapy in Vietnam: results*

from a national evaluation. *PLoS One*. 8(2), e55750.

Rangarajan, S., et al. (2014). Risk factors for delayed entrance into care after diagnosis among patients with late-stage HIV disease in southern Vietnam. *PLoS one*, 9(10), e108939.

Web sites:

Web-1:<http://baoangiang.com.vn/tang-cuong-phong-chong-hiv-aids-ma-tuy-mai-dam-a207584.html>, accessed 1 January 2018.

Web-2: <http://vaac.gov.vn/solieu/Detail/Bao-cao-cong-tac-phong-chong-HIV-AIDS-nam-2017-va-nhiem-vu-trong-tam-nam-2018>, accessed 4 December 2017.

Web-3:<http://vaac.gov.vn/Tin-Tuc/Detail/Khong-lay-nhiem-HIV-qua-duong-tinh-duc-neu-tai-luong-HIV-duoi-nguong-phat-hien>, accessed 26 November 2017.

Web-4: <http://vaac.gov.vn/Tin-Tuc/Detail/Su-kien-Khong-phat-hien-Khong-lay-truyen-Su-kien-quan-trong-huong-ung-Ngay-The-gioi-phong-chong-AIDS-01-12---Sao-chep>, accessed 1 December 2018.

phong-chong-AIDS-01-12---Sao-chep, accessed 1 December 2018.

Web-5:

[http://vaac.gov.vn/vanban\\_detail/Detail/Quyết-dinh-so-5418-QĐ-BYT-ngay-01-12-2017-cua-Bộ-Y-te-ve-viec-ban-hanh-Huong-dan-dieu-tri-va-cham-soc-HIV-AIDS](http://vaac.gov.vn/vanban_detail/Detail/Quyết-dinh-so-5418-QĐ-BYT-ngay-01-12-2017-cua-Bộ-Y-te-ve-viec-ban-hanh-Huong-dan-dieu-tri-va-cham-soc-HIV-AIDS), accessed 1 December 2017.

Web-6:

<http://www2.chinhphu.vn/portal/page/portal/chinhphu/noidungchienluocphattrienkinhtexahoi?docid=1294&substract=&strutsAction=ViewDetailAction.do>, accessed 25 December 2012.

Web-7:

[https://www.unaids.org/sites/default/files/media\\_asset/unaid-data-2018\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/unaid-data-2018_en.pdf), accessed 1 July 2018.

Web-8: Website: <http://vaac.gov.vn/Tai-Lieu/Detail/Huong-dan-tong-hop-ve-viec-sudung-thuoc-khang-vi-rut-sao-chep-nguoc-trong-du-phong-va-dieu-tri-nhiem-HIV>, accessed 1 June 2013