RESEARCH ARTICLE

REVISED Results of early warning indicators for HIV/AIDS in 42 outpatient clinics in 25 northern provinces of Vietnam

[version 2; peer review: 1 approved with reservations]

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Abstract

Background: The emergence of HIV drug resistance (HIVDR) is an unavoidable consequence of antiretroviral therapy (ART), and HIVDR early warning indicators (EWIs) could specifically assess factors at individual clinics associated with HIVDR. Thus, the present study aimed to collect data on EWIs for HIV/AIDS at 42 outpatient clinics (OPCs) in 25 northern provinces and cities of Vietnam in 2012.

Methods: A retrospective cohort study was conducted. Data was collected from 42 OPCs in 25 northern provinces between October and December 2012. The information was collected retrospectively from outpatient records from 2008 to 2011.

Results: In total, 99.8% ART patients were prescribed the correct regimen when starting ART treatment. All facilities met the target of under 20% patients lost to follow-up at 12 months. A total of 33/42 facilities reached the goal for on-time appointment keeping and 37/42 facilities achieved the target of first-line retention after 12-month ARV treatment.

Conclusions: EWIs should be performed routinely in HIV/AIDS facilities. The data collected will contribute to monitoring, supervision, periodic assessment, and future plans for HIV/AIDS care and treatment programs in the area.

Keywords

ARV, HIV drug resistance, outpatient clinics, early warning indicators

Open Peer Review

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REVISED Amendments from Version 1

In this new version, we have added more details in the Introduction and added a variable to clarify the ARV measurement. The Methods section now includes the mention of the “availability of antiretroviral drugs” in order to be consistent with the Results section. In the Results section, we have also corrected the name “Quang Yen Hospital, Quang Ninh” as it was in version 1, to “Yen Hung Hospital, Quang Ninh” for consistency with [Table 1](#) and [Table 2](#). [Table 2](#) has been amended and the Results section has been clarified. We have added one new paragraph regarding the limitation of this study, in the Discussion section.

See referee reports

Introduction

According to UNAIDS, the number of people living with HIV/AIDS globally has continuously increased and reached to approximately 33 million at end of 2009. The number of new infections in 2009 was 2.6 million, and the number of people living with HIV (PLHIV) rose from 8 million in 1990 to 33 million in 2009¹. Fortunately, the number of new infections and deaths caused by AIDS has significantly reduced thanks to antiretroviral treatment (ART). According to the World Health Organization, at the end of 2008, an estimated 4 million PLHIV were receiving ART in low-income and middle-income countries. Worldwide, ART coverage has increased from 7% in 2003 to 42% in 2009².

Although Vietnam is among the most-at-risk countries for HIV¹, the government has responded to HIV epidemics. As of December 2011, there was a total of 318 antiretroviral (ARV) treatment facilities nationwide, including 287 outpatient clinics (OPCs) for adults and 118 ARV treatment facilities for children. The total number of HIV infections treated with ARV was increased to 60,000, an increase of 25 times compared to the end of 2005^{3,4}.

According to the national plan regarding preventing and monitoring HIV drug resistance (HIVDR) in 2008–2012, Vietnam collects early warning indicators (EWIs) for HIVDR annually. This important activity not only contributes to the prevention and monitoring of HIVDR, but also supports the usage of available data to monitor and evaluate HIV/AIDS care and treatment programs, in order to improve the quality of service delivery. Within the framework of the Global Fund supported project on HIV/AIDS, we conducted this study to interpret results after collecting HIVDR EWIs at 42 HIV/AIDS treatment facilities in 25 northern provinces of Vietnam in 2012. The results of this study evaluate HIV/AIDS treatment effectiveness based on care and treatment national indicators.

Methods

Study design and settings

A cross-sectional study was conducted between October and December 2012 in 25 northern provinces, including: Bac Giang, Bac Kan, Bac Ninh, Cao Bang, Dien Bien, Ha Giang, Ha Nam, Ha Noi, Hai Duong, Hai Phong, Hoa Binh, Hung Yen, Lang Son, Nam Dinh, Ninh Binh, Nghe An, Phu Tho, Quang Ninh, Son La, Thai

Binh, Thai Nguyen, Thanh Hoa, Tuyen Quang, Vinh Phuc and Yen Bai. OPCs met the following inclusion criteria would be included in the study:

- Regarding administrative units: included urban and rural facilities.
- Regarding patients at the facilities: included adults and children.
- Regarding care and treatment supported agencies: included institutions under the National target programs; Global Fund and President’s Emergency Plan for AIDS Relief (PEPFAR) funding.

We involved all OPCs that met the inclusion criteria. A total of 42 OPCs in these provinces were selected.

Variables and measurements

EWI systems has been implemented according to the guidelines of the Vietnam Authority of HIV/AIDS Control (VAAC), Ministry of Health⁵. EWI data was extracted by the research team using a data collection form that was developed by VAAC ([Supplementary File 1](#)). HIV drug resistance EWIs collected in the present study, from the OPCs, included: percentage of patients that were prescribed the correct regimen when starting ART treatment; percentage of ART patients that were lost to follow-up after 12 months; percentage of patients that arrived on time for a doctor’s appointment; and percentage of patients that retained first-line ART after 12 months of treatment; and the availability of antiretroviral drugs in facilities.

Statistical analysis

Excel 2010 software (Microsoft Corp.) was used to clean and analyze the data. Descriptive statistical analysis, including frequency and percentage, was used to analyze the data.

Ethical approval

The study received ethical approval from VAAC, Ministry of Health. Data collection procedures and the use of data for analysis were also approved by the directors of the OPCs. No personal patient data was collected in this study.

Results

[Table 1](#) describes EWIs in 42 HIV/AIDS facilities in 2012. Regarding the availability of antiretroviral drugs, EWIs for HIVDR showed that 7/42 facilities did not reach the target of patients receiving prescriptions for ART, congruent with national guidelines⁵. Regarding patients that abandoned ART treatment after 12 months, only Cao Bang Hospital had a relatively high proportion (15.79%). All facilities (100%) reached the target of <20% of patients lost to follow-up after 12 months of treatment.

Some facilities had very low rate of patients arriving on time for appointments, such as Pho Yen, Thai Nguyen, Cao Loc - Lang Son ([Table 2](#)). Data regarding patient appointments could not be collected at Yen Hung Hospital, Quang Ninh, because this hospital did not make appointments with patients. Regarding the rate of patients retaining on a first line ARV regimen after 12 months of treatment, only a few facilities did not achieve its

Table 1. Description of early warning indicators in 42 HIV/AIDS facilities in 2012 regarding receiving correct ART regimen when starting treatment and loss to follow-up after 12 months.

	Outpatient clinic	Received correct ART regimen when starting treatment			Loss to follow-up after 12 months		
		1–12/2011			1–12/2011		
		Target = 100%			Target ≤ 20%		
		N ^a	N ^b	%	N ^c	N ^d	%
1	Bac Giang AIDS Center	53	53	100	1	14	7.1
2	National Hospital of Tropical Diseases	262	264	99.3	6	194	3.1
3	National Pediatric Hospital	93	94	100	0	95	0.0
4	Dong Da Hospital, Hanoi	167	168	100	3	125	2.4
5	Dong Anh, Hanoi	94	94	100	4	106	3.8
6	Tu Liem, Hanoi	46	46	100	0	52	0.0
7	Long Bien, Hanoi	59	59	100	1	53	1.9
8	Hai Duong AIDS Center	139	139	100	14	144	9.7
9	Viet Tiep Hospital, Hai Phong	153	153	100	10	215	4.7
10	Hai Phong Padiatric Hospital	16	17	100	0	25	0.0
11	Le Chan, Hai Phong	63	63	100	0	83	0.0
12	An Duong, Hai Phong	27	27	99.2	0	32	0.0
13	Hung Yen AIDS Center	36	36	99.8	2	23	8.7
14	Cao Loc, Lang Son	32	32	99.4	3	40	7.5
15	Giao Thuy, Nam Dinh	26	26	100	0	18	0.0
16	Ninh Binh AIDS center	114	114	100	0	74	0.0
17	Nghe An General Hospital	232	232	100	6	217	2.8
18	Nghe An Pediatric Hospital	12	12	100	0	16	0.0
19	Phu Tho Health Commune, Phu Tho	69	69	100	3	75	4.0
20	Vietnam Sweden Uong Bi General Hospital, Quang Ninh	33	33	94.1	2	62	3.2
21	Quang Ninh General Hospital	129	129	100	8	165	4.8
22	Yen Hung, Quang Ninh	32	32	100	1	35	2.9
23	Mai Son, Son La	161	161	100	15	111	13.5
24	Pho Yen, Thai Nguyen	74	74	100	5	97	5.2
25	Dai Tu, Thai Nguyen	67	67	100	8	82	9.8
26	Thanh Hoa General Hospital	10	10	100	2	17	11.8
27	Vinh Phuc AIDS center	108	108	100	2	62	3.2
28	Yen Bai General Hospital	20	20	100	0	27	0.0
29	Cao Bang General Hospital	21	21	100	6	38	15.8
30	Cho Moi, Bac Can	16	16	100	0	15	0.0
31	Bac Ninh General Hospital	73	73	100	0	64	0.0
32	Tuan General Hospital	181	181	100	26	232	11.2
33	Ha Giang HIV/AIDS prevention center	83	84	98.8	1	7	14.3
34	Ly Nhan Health Center, Hanoi	23	23	100	0	8	0.0
35	Ha Dong Hospital, Hanoi	90	90	100	0	122	0.0
36	Tay Son Hospital, Hanoi	46	46	100	2	38	5.3
37	Chi Linh Health Center	9	9	100	1	12	8.3
38	Hoa Binh General Hospital	143	144	99.3	5	124	4.0
39	Health Center, Nam Dinh City	13	13	100	0	9	0.0
40	Health Center, Kien Xuong District	35	35	100	1	21	4.8
41	Health Center, Ngoc Lac District	77	77	100	3	81	3.7
42	Health Center, Yen Son District	25	25	100	0	7	0.0
Totals		3162	3169	99.8	141	3167	4.45

a: Number of patient received correct ART regimen when starting treatment; *b:* Number of patients starting treatment; *c:* Number of patients lost to follow-up after 12 months of treatment; *d:* Number of patients registered in the cohort

Table 2. Description of early warning indicators in 42 HIV/AIDS facilities in 2012 regarding patients arriving on time for appointments in the last quarter of 2011 and retaining on first-line ARV regimen after 12 months of treatment.

	Outpatient clinic	Patients arriving on time for appointments in last quarter of 2011			Retaining on first-line ART regimen after 12 months of treatment		
		10–12/2011			1–12/2011		
		Target ≥ 80%			Target ≥ 70%		
		N ^a	N ^b	%	N ^c	N ^d	%
1	Bac Giang AIDS Center	100	100	100.0	12	14	85.7
2	National Hospital of Tropical Diseases	141	187	75.4	193	194	99.5
3	National Pediatric Hospital	120	130	92.3	67	95	70.5
4	Dong Da Hospital, Hanoi	152	155	98.1	117	125	93.6
5	Dong Anh, Hanoi	153	155	98.7	97	106	91.5
6	Tu Liem, Hanoi	151	153	98.7	46	52	88.5
7	Long Bien, Hanoi	101	110	91.8	42	53	79.2
8	Hai Duong AIDS Center	126	144	87.5	115	144	79.9
9	Viet Tiep Hospital, Hai Phong	150	176	85.2	170	215	79.1
10	Hai Phong Padiatric Hospital	74	100	74.0	24	25	96.0
11	Le Chan, Hai Phong	123	125	98.4	80	83	96.4
12	An Duong, Hai Phong	100	100	100.0	32	32	100.0
13	Hung Yen AIDS Center	49	51	96.1	11	23	47.8
14	Cao Loc, Lang Son	39	125	31.2	36	40	90.0
15	Giao Thuy, Nam Dinh	83	94	88.3	15	18	83.3
16	Ninh Binh AIDS center	95	102	93.1	71	74	95.9
17	Nghe An General Hospital	118	160	73.8	179	217	82.5
18	Nghe An Pediatric Hospital	60	63	95.2	14	16	87.5
19	Phu Tho Health Commune, Phu Tho	94	110	85.5	64	75	85.3
20	Vietnam Sweden Uong Bi General Hospital, Quang Ninh	130	131	99.2	57	62	91.9
21	Quang Ninh General Hospital	174	175	99.4	132	165	80.0
22	Yen Hung, Quang Ninh		NA		28	29	80.2
23	Mai Son, Son La	92	119	77.3	89	111	80.2
24	Pho Yen, Thai Nguyen	56	129	43.4	79	97	81.4
25	Dai Tu, Thai Nguyen	101	110	91.8	57	82	69.5
26	Thanh Hoa General Hospital	81	83	97.6	8	17	47.1
27	Vinh Phuc AIDS center	119	120	99.2	48	62	77.4
28	Yen Bai General Hospital	69	72	95.8	22	27	81.5
29	Cao Bang General Hospital	75	75	100.0	26	38	68.4
30	Cho Moi, Bac Can	33	33	100.0	15	15	100.0
31	Bac Ninh General Hospital	93	112	83.0	59	64	92.2
32	Tuan General Hospital	84	120	70.0	158	232	68.1
33	Ha Giang HIV/AIDS prevention center	30	43	69.8	2	7	28.6
34	Ly Nhan Health Center, Hanoi	58	63	92.1	8	8	100.0
35	Ha Dong Hospital, Hanoi	102	140	72.9	110	122	90.2
36	Tay Son Hospital, Hanoi	73	82	89.0	28	38	73.7
37	Chi Linh Health Center	42	75	56.0	9	12	75.0
38	Hoa Binh General Hospital	142	143	99.3	99	124	79.8
39	Health Center, Nam Dinh City	102	102	100.0	9	9	100.0
40	Health Center, Kien Xuong District	55	61	90.2	21	21	100.0
41	Health Center, Ngoc Lac District	92	111	82.9	67	81	82.7
42	Health Center, Yen Son District	43	43	100.0	6	7	85.7
Totals		3875	4482	88.1	3034	2522	83.1

a: Number of patients arriving on time for appointments in last quarter of 2011; *b*: Number of patients having appointments in last quarter of 2011; *c*: Number of patients retaining ART after 12 months of treatment; *d*: Number of patients registered in the cohort

objectives, including Dai Tu, Thai Nguyen, Hung Yen provincial AIDS center, Thanh Hoa hospital.

Dataset 1. Raw data used in the construction of Table 1 and Table 2

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Datasets from early warning indicator systems detailing number of patients starting ART; number of patients in cohort; number of patients lost to follow-up; number of patients retaining ART treatment; number of patients receiving correct regime; number of patients having appointments in last quarter of 2011; and number of patients keeping appointments. on-time.

Discussion

This study aimed to interpret results after collecting HIVDR EWIs at 42 HIV/AIDS treatment facilities in 25 northern provinces of Vietnam in 2012. The findings indicate that 35/42 (83.3%) of facilities reached the goal for patients receiving prescriptions for ART congruent with national guidelines, and 100% of facilities reached the target of <20% of patients lost to follow-up after 12 months. In addition, 31/42 (73.8%) facilities reached the goal for patients arriving on time for appointments, 1/42 (2.38%) facilities had no data (NA) for patients arriving on time for appointments and 37/42 (88.1%) facilities achieved the target for first line retention after a 12-month ARV treatment. These figures are higher in comparison with other Asian countries, found in a multi-country survey by the WHO - among 1048 clinics, 64–80% reached the goals of the EWIs⁶.

Several implications are drawn from this study. First, since the data about EWIs could be used to optimize the ART program⁶, based on the result of this study, clinics that have a low performance should identify their weaknesses and find corresponding solutions to improve their services. Second, several achievements that were reported in this study should be maintained by the OPCS, including maintaining that all patients receive correct ARV regimens on admission, and continuing a patient roll-out rate of ≤20%. Third, health care providers in ARV facilities should ensure that there are no ARV drug shortages in order that patients are sufficiently provided. It is important to ensure a minimum of 80% of patients receive ARV drugs as scheduled⁴. This could be performed by enhancing outpatient records to track medication dispensing history. Finally, all facilities should regularly review treatment-related data regarding treatment monitoring and EWIs of HIVDR, and issuing data collection activity of HIVDR EWIs should become a routine activity in clinics. Health care providers should address the reasons patients dropped out of

treatment regimens, and why patients did not come to follow-up appointments. This could help to improve the quality of service delivery and optimize the benefits of ARV treatment.

The recording, management and writing of medical records during the data collection processes in old facilities (facilities collecting data from 2011 and earlier) has improved greatly. However, there are several problems related to arranging and writing medical records in facilities collecting data from 2012 and onwards. Therefore, finding data entries and medical records is very difficult and this could affect the quality of services.

Conclusions

Our study suggests that all outcomes measured in the OPCs reached standard goals, according to national guidelines. These remarkable achievements should be maintained. In addition, other considerations should be addressed, including the roll-out rate, the follow-up rate, and the rate of first line retention after 12-month ARV treatment.

Data availability

Dataset 1: Raw data used in the construction of Table 1 and Table 2. Datasets from early warning indicator systems detailing number of patients starting ART; number of patients in cohort; number of patients lost to follow-up; number of patients retaining ART treatment; number of patients receiving correct regime; number of patients having appointments in last quarter of 2011; and number of patients keeping appointments on-time. doi, [10.5256/f1000research.11010.d157508](http://dx.doi.org/10.5256/f1000research.11010.d157508)⁷

Author contributions

HTL, LTLD, DKP, HPD, HLN conceived of the study, and participated in its design and implementation and wrote the manuscript. HTL, LTLD analyzed the data. All authors read and approved the final manuscript.

Competing interests

No competing interests were disclosed.

Grant information

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Supplementary material

Supplementary File 1: Data collection form developed by Vietnam Authority of HIV/AIDS Control, used to collect data about early warning indicators from outpatient clinics.

[Click here to access the data.](#)

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[Data Source](#)

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Nghia Van Khuu

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Strengths: The paper has described some early warning indicators (EWI) recorded at 42 outpatient clinics (OPC) in northern Vietnam, assisting on having better directions for minimizing risks for HIV drug resistance given the growing widespread of antiretro therapy (ART).

Weak points and suggestions for revision: the paper has some points in need of being re-considered:

- Introduction: paragraph 2, the authors wrote, "As of December 2011, (.....). The total number of HIV infections treated with ARV was increased to 600, an increase of 25 times..." The number 600 seems not to be correct because, as of 2011, more than 60,000 HIV cases were reported to get ART according to a VAAC report. The authors should check information and revise the number accordingly.
- Methods: There were inconsistencies between assessing indicators and outcomes. In the paragraph "Variables and measurements", the paper listed only four indicators, including (1) percentage of patients that were prescribed the correct regimen when starting ART treatment; (2) percentage of ART patients that were lost to follow-up after 12 months; (3) percentage of patients that arrived on time for a doctor's appointment; and (4) percentage of patients that retained first-line ART after 12 months of treatment whereas in RESULTS section, there is one additional indicator entitled "the availability of antiretroviral drugs". However, the latter indicator has not been described and discussed thereafter. The authors should provide additional information for this indicator in the method, results and discussion sections.
- Results: Information described in the results section are not compatible with those in the data table. In paragraph 2 of Results section, the paper has the OPC name as "Quang Yen Hospital, Quang Ninh" whereas Table 2 reported the information as "Yen Hung, Quang Ninh". Information in descriptive words and in the table should be consistent.

- Discussion: The authors wrote, “33/42 (78.6%) facilities reached the goal for patients arriving on time for appointments” but data in Table 2 revealed that only 31/42 OPC reached the goal for patients arriving on time for appointments and 1/42 OPC had no data (N/A). We suggest the authors review and revise information to correct this.

In short, the paper is not well-cohesive and information insufficient. The outcomes described in results section are quite simple, but few indicators unstated in the former sections have been discussed in DISCUSSION section. Moreover, the limitation section has been intertwined into the results section, making it more or less difficult for readers to follow through. The authors should re-structure information pieces to appropriate order to make the paper more cohesive.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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