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A Study on Socio-Demographic and Clinical Profile of Patients on Second Line Anti-Retroviral Therapy Registered at ART Centre in Surat City

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ABSTRACT

Background: India needs concrete data on the number of people requiring second-line HIV drugs, as drug resistance threatens the national programme. This study examines the socio-demographic and clinical profile of patients on second-line ART at an ART Centre in Surat.

Methodology: A cross-sectional study was conducted at a Gujarat ART centre providing free second-line ART. Data were collected using a pretested semi-structured questionnaire through patient interviews and treatment records.

Results: The most common reason for switching to second-line ART was virological failure (84.2%). The mean duration of first-line ART was 30.15 months (S.D. 25.35). All patients received ritonavir-boosted PI, with 66.7% on Atazanavir-ritonavir. Around 30% had a history of substitution within second-line ART.

Conclusion: Early detection of first-line ART failure and improved availability of second-line drugs should be national priorities. Patients with tuberculosis post-ART initiation, treatment interruptions, private facility treatment, nuclear family backgrounds, and lower socioeconomic status should be monitored for ART failure.

Keywords: Socio-Demographic Profile, Clinical Profile, Second Line Anti-Retroviral Therapy, ART Centre, HIV

INTRODUCTION

HIV remains one of the deadliest infectious diseases globally, having claimed over 25 million lives in the past thirty years. India ranks third in terms of the estimated number of people living with HIV/AIDS, following South Africa and Nigeria. [1] Gujarat is classified as a 'medium prevalence' state, with the epidemic primarily concentrated among Men Who Have Sex with Men (MSM) and Female Sex Workers (FSWs), where prevalence rates are approximately 20 times higher than those in the general population, as reported by the HIV Sentinel Surveillance. The Care, Support, and Treatment (CST) program currently facilitates the prevention and management of opportunistic infections, provides Anti-Retroviral Therapy (ART), offers psychosocial support, home-based care,

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positive prevention strategies, and measures to mitigate the impact of the disease. Community Care Centres play a crucial role in providing psychological and social support, ensuring adherence to medication, managing opportunistic infections, and tracking cases lost to follow-up. [1]

In India, treatment failure where a patient does not respond to first-line ART has been on the rise, accompanied by the emergence of drug-resistant HIV strains. Additionally, treating individuals co-infected with tuberculosis and viral hepatitis has posed a significant challenge. [2,3] To address these issues, second-line antiretroviral (ARV) therapy was introduced, offering a vital lifeline for patients who do not respond to initial ART treatment. However, limited access to viral load testing, genotyping, and the availability of second-line treatment options has resulted in underdiagnosis of treatment failure. [4,5] Consequently, many eligible patients are not transitioned to second-line therapy in time, leading to increased mortality rates. [6]

Several factors contribute to virological failure (defined as a viral load exceeding 1,000 copies/ml), including inconsistent adherence to medication, tuberculosis diagnosis after ART initiation, insufficient concentrations of non-nucleoside reverse transcriptase inhibitors (NNRTIs), general clinical symptoms, and a lower weight than recorded at baseline. [7] The impact of HIV/AIDS is most severe among young adults in their prime, presenting a serious challenge in the areas of healthcare, social stability, and economic progress particularly in a developing country like India. The growing prevalence of drug-resistant cases and the transmission of resistant HIV strains threaten the long-term viability of national HIV programs.

Currently, there is no comprehensive data in India on the number of individuals requiring second-line HIV medications. The rapid spread of drug resistance poses a critical threat to the sustainability of national health initiatives. Thus, it is essential to examine the reasons behind virological failure in second-line regimens, particularly in resource-constrained settings, to prevent such occurrences. Identifying key contributing factors can help facilitate early intervention, prevent drug resistance, and guide the need for treatment alternatives beyond first-line ART in India. This study aims to analyze the local epidemiology of drug-resistant cases and determine the causes behind first-line ART failure.

MATERIALS AND METHODS

The present study was a Cross-sectional study conducted at the ART centre of a tertiary care Hospital in south Gujarat, India Surat - which is among the ART centres of Gujarat, which are providing free second line ART. The data collection was carried out for a period of 6 months during the year 2021. Sample size of 114 had been calculated with the help of Epi Info software, taking 300 as the population- patients on second line ART, 13.8% as prevalence of drug resistance mutation [8] (Sungkanuparph et al., 2011), 95% confidence interval, 10% allowable error (5% absolute precision) and design effect of 1.

The PLHAs taking second line ART were contacted by investigators and an attempt was made to convince them to participate in the study after informing them about the aims, objectives and likely benefits which would accrue from the study. The patients were approached through the ART centre of New Civil Hospital, Surat when the HIV positive patients were coming to take their ART every Wednesday. ART centre was considered a better place of contact than their home because there were chances of stigma, disclosure and discrimination issues at home. The ART centre, thus acted like a place of contact for the patients.

The study was conducted by pretested semi-structured questionnaire. The data was collected by oral interview technique and from the treatment card of patients. Those patients giving written consent were interviewed by investigators in separate room. The information regarding socio-demography and clinical variables, treatment and sexual activity were taken by oral interview of patients. While information regarding laboratory profile, adherence and treatment history were taken from patient treatment cards.

Inclusion Criteria: All patients on second line ART as per NACO guidelines registered at ART centre of New Civil Hospital, Surat; above 18 years of age and giving informed written consent were included. In case of minor, informed written consent of parents was taken.

Ethical Issue: Owing to ethical consideration, permission was obtained from the Institutional Ethical Committee of the hospital before commencing of the study. Informed written consent would be taken after persuading the participants about the possible benefits and implications of the study. In case of illiterate participants, consent was obtained in the presence of a literate witness. Consent was taken in mother tongue of the participants.

Statistical Methods: Data entry was done in Microsoft Excel. Data analysis was done in SPSS software version 16 (licensed to VNSGU, Surat). Simple proportions and percentage were calculated.

RESULTS

The Mean age of patients receiving second line ART was 42.14 years (SD = 8.643) with a median of 41.5 years and the majority (43.9%) patients belonged 40-49 years of age group. Gender wise distribution of participants showed that first line ART failure was more common among men (78.9%) compared to females. Majority of participants belonged to nuclear families (71.1%) and non-migrant community (92.1%). Educational status of patients was illiterate (6.1%), below primary (24.6 %), primary (36.8%), secondary (16.7%), higher secondary (5.3%) and graduate and above graduate level (10.5%).

Majority (80.7%) were lived in urban area and median distance between ART center and residence of patients was 14.5 kms. Labourer was most common occupational group and majority (86.8%) belonged to low socio-economic class according to modified Prasad's classification.

Common clinical presentation of patients was pain/ numbness/ tingling sensation of hands/feet (47.80%), blurring of vision (37.70%), fever (29.00%), skin reactions -dryness/ itching /loss of hair (26.10%).

As described in table 2, at the start of ART mean CD4 of patients was 162.84 (S.D=104.919) with a median CD4 of 138. Last measured while on 2nd line ART, mean CD4 of patients was 416.65 (S.D=211.931) with a median CD4 of 378. Viral was found more than 10,000 copies per ml of blood in 91% of patients at time of first line ART failure which was reduced to 6.7% among patients who had taken at least 6 months of second line ART. Anemia was found in only 9% patients taking second line ART compared to 23.3% and 20.2% of patients at start of ART and at time of ART failure respectively.

Opportunistic infections were found during first line and second line ART in 77.8% and 35.1% patients respectively. Tuberculosis was most common opportunistic infection found both during first line and second line ART and majority were pulmonary type.

Table 1: Socio-demographic profile for patients on second line treatment (n=114)

Socio-demographic Variables	Cases (%)
Age-group	
10-19	2 (1.8)
20-29	3 (2.6)
30-39	38 (33.3)
40-49	50 (43.9)
50-59	17 (14.9)
60-69	4 (3.5)
Gender	
Male	90 (78.9)
Female	24 (21.1)
Community	
Migrant	9 (7.9)
Non migrant	105 (92.1)
Education	
Illiterate	7 (6.1)
Below primary	28 (24.6)
Primary	42(36.8)
Secondary	19 (16.7)
Higher Secondary	6 (5.3)
Graduation & above	12 (10.5)
Occupation	
Labour	44 (38.6)
Self employed	21 (18.4)
Housewife	21 (18.4)
Service	18 (15.8)
Unemployed	9 (7.9)
Student	1 (0.9)

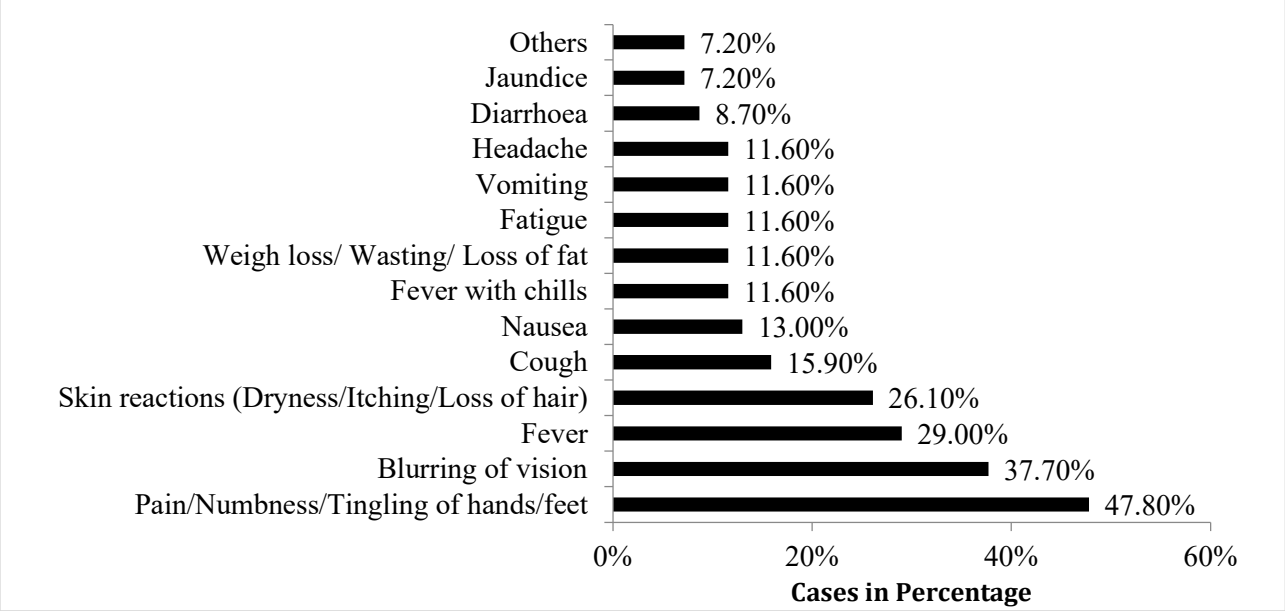

Figure 1: Clinical profile (including side effects) wise distribution of patients (n=69)

Table 2: Distribution of CD4 count

Parameters	At start of ART (n=69)	At time of failure (n=93)	Last measured on 2nd line (n=101)
Mean	162.84	170.38	416.65
Median	138.00	138.00	378.00
Std. Deviation	104.919	126.145	211.931
Range	402	667	1025
Minimum	9	10	20
Maximum	411	677	1045

Table 3: Schedule of First line ART and reasons for substitution

First line ART	NRTI	Cases (%)	NNRTI	Cases(%)
Initial first line regimen component	Zidovudine	58 (56.9)	Nevirapine	86 (84.3)
	Stavudine	42 (41.2)	Efavirenz	16 (15.7)
	Tenofovir	2 (1.9)	Total	102 (100)
	Total	102 (100)		()
First substitution	Stavudine	32 (57.1)	Efavirenz	35 (85.4)
	Zidovudine	19 (33.9)	Nevirapine	6 (14.6)
	Tenofovir	5 (8.9)	Total	41 (100)
	Total	56 (100)		
Reasons for substitution	Toxicity/Side effects	53 (94.6)	Toxicity/Side effects	26 (63.4)
	Tuberculosis	3 (5.4)	Tuberculosis	11 (26.8)
	Total	56 (100)	ATT completed	2 (4.9)
			Other	2 (4.9)
			Total	41 (100)
Second Substitution	Stavudine	1 (10)		
	Tenofovir	9 (90)		
	Total	10 (100)		
Reasons for substitution	Toxicity/Side effects	10 (100)		

Information regarding first line regimen was not available in 12(10.5%) cases.

Table 4: Failure of first line ART (multiple answers, n=114).

Failure of first line ART	Cases (%)
Virological failure	96 (84.2)
Immunological failure	76 (66.7)
Clinical failure	33 (28.9)

Table 5: Second line ART regimen taken by patients (n=114)

Second line ART regimen	Cases (%)
Initial second line regimen PI component (n=114)	
Atazinavir-ritonavir boosted	76 (66.7)
Lopinavir-ritonavir boosted	34 (29.8)
Indinavir-ritonavir boosted	4 (3.5)
Substitution within PI regimen (n=34)	
Atazinavir-ritonavir boosted	33 (97.1)
Lopinavir-ritonavir boosted	1 (2.9)
Reasons for substitution (n=34)	
Toxicity/ Side effects	8 (23.5)
ATT completed	12 (35.3)
Guideline	10 (29.4)
Don't know	4 (11.8)

Table 6: Harmful effects of second line ART (multiple answers, n=9)

Harmful effects of second line ART	Cases (%)
Side effects	7 (77.8)
Feeling weakness	2 (22.2)
Get TB	2 (22.2)
Yellowish discolouration of urine	2 (22.2)
Decrease CD4	1 (11.1)
Redness of eyes	1 (11.1)

Out of 102 cases, NRTI (Nucleotide Reverse Transcriptase Inhibitors) components at the start of treatment were Zidovudine (56.9%), Stavudine (41.2 %) and Tenofovir (1.9%). First substitution within NRTI component of first line regimen done with Stavudine (57.1 %), Zidovudine (33.9%) and Tenofovir (1.9%) which might attributed either due to toxicity/side effects (94.6%) or tuberculosis (5.4%).

NNRTI (Non-Nucleotide Reverse Transcriptase Inhibitors) component at the start of treatment were Nevirapine (84.3%) or Efavirenz (15.7%). Substitution within NNRTI component of first line regimen were done either with Efavirenz (85.4) %) or Nevirapine (14.6%). Reasons for substitution included were Toxicity/side effects (63.4%), Tuberculosis (26.8%), completion of ATT (4.9%) and others (4.9%).

Most common reason for switch to second line ART was virological failure (84.2%). Mean duration of first line ART treatment was 30.15 (S.D. 25.350) months. All patients were given ritonavir boosted PI. Majority (66.7%) were given Atazinavir-ritonavir boosted PI and around 30% had history of substitution within second line ART. Adherence below 95% was found in 6.2% patients taking second line ART.

Harmful effects of second line ART perceived by patients were side effects (77.8%), feeling weakness (22.2%), acquire tuberculosis (22.2%), yellowish discolouration of urine (22.2%), decrease CD4 (11.1%) and redness of eyes (11.1%). Majority (73.7%) patients feel better than before after taking second line ART.

DISCUSSION

In the present study first substitution within NRTI component of first line regimen done with Stavudine (57.1 %), Zidovudine (33.9%) and Tenofovir (1.9%) which was attributed either due to toxicity/side effects (94.6%) or tuberculosis (5.4%). In the study of South Africa to determine acquired drug resistance in patients failing first line ART, Manasa J, et al. had reported NRTI substation in 23% patients who failed on first line ART.[9] In the present study substitution within NNRTI component of

first line regimen were done either with Efavirenz (85.4) %) or Nevirapine (14.6%). In the study of South Africa to determine acquired drug resistance in patients failing first line ART, Manasa J, et al. had reported NNRTI substation in 15% patients who failed on first line ART. [9] In the matched case-control study to determine associations with virological failure, Datay, et al. had reported substitution within NNRTI component in 15% patients who failed first line ART. [10] In the study of South Africa, Fox MP, et al had reported substitution of ARV within first line ART was done in 43.9% patient who failed first line ART. [11]

In study on factors for treatment failures and mortality in patients on second line therapy, Pujades-Rodrı´guez, et al. (2010) had reported 28.6% had single substitution within NRTI while 71.4% had two substitutions within NRTI.[12] In study on second line therapy in resource limited settings, Pujades-Rodrı´guez, et al. (2008) had reported 33.3% had single substitution within NRTI while 66.7% had two substitution within NRTI.[13]

In study on second line therapy in resource limited settings, Pujades-Rodrı´guez, et al. (2008) had reported boosted PI was initiated in only 56% cases. [13] In the study of profile of patients on second line ART in Nigeria, Onyedum CC, et al. had reported all 186 patients received Lopinavir-ritonavir boosted PI as component of second line ART. [14] In study on factors for treatment failures and mortality in patients on second line therapy, Pujades-Rodrı´guez, et al. had reported 52% patients on second line ART were on Lopinavir-Ritonavir boosted PI regimen, 40.3% Nelfinavir only 7.7% on others. [12]

In the present study all patients were given ritonavir boosted PI as PI component of second line ART regimen which included Atazinavir-ritonavir boosted PI (66.7%), Lopinavir-ritonavir boosted PI (29.8%) and Indinavir-ritonavir boosted (3.5%).

In the present study, most common reason found for switch to second line ART was virological failure (84.2%). In the study of profile of patients on second line ART in Nigeria, Onyedum CC, et al. had reported reasons for switch to second line ART were virological failure (79.0%), immunological failure (16.7%), clinical failure (2.2%) and ART toxicity (2.2%). [14]

Neogi U, et al. had reported out of 323 patients on first line ART, 2.9% had developed virological failure.[15] Keisar had reported virological failure as most common (78.9%) reason for switching second line ART followed by clinical failure (9.5%), immunological failure (4.8%), toxicity (2.7%) and unknown (4.1%).[6]

In the study of resistance-associated mutations in hiv-1 among patients failing first-line antiretroviral therapy, Saini S, et al. had found virological failure in 65.7% of patients according to WHO criteria (PVL >log (10) 4.0).[16]

In the study of China for predictors of virological failures, Ma, et al. had reported 93.2% patients believe health effects were positive in case of ART.[17]

CONCLUSION

On the basis of our findings, we conclude that early detection of first-line treatment failure and improve availability/affordability of second-line regimens should become priorities in National Programme. First line ART patients with history of tuberculosis following ART initiation, treatment interruptions, treatment from private facility, belonging to nuclear family and lower social-economic class should be watched for ART failure.

Author contribution: GP: Contributed to all aspects of the study, including study conception, study design, data collection, data analysis and interpretation, and manuscript preparation. **SP:** Primarily involved in data analysis and interpretation, and manuscript preparation. **SA and NP:** Contributed to study conception, data analysis and interpretation, and manuscript preparation.

REFERENCES

1. National AIDS Control Organization (2012). Department of AIDS Control, Ministry of Health and Family Welfare, Government of India, New Delhi. Annual Report 2011-2012.
2. Edward J Mills, William A Schabas, Jimmy Volmink, Roderick WalkeR et al.Should active recruitment of health workers from sub-Saharan Africa be viewed as a crime? The Lancet 2008; 371 (9613): 685-688. DOI: https://doi.org/ 10.1016/S0140-6736(08)60308-6
3. Bhaskaran K, Hamouda O, Sannes M, Boufassa F, Johnson AM, Lambert PC, Porter K; CASCADE Collaboration. Changes in the risk of death after HIV seroconversion compared with mortality in the general population. JAMA. 2008 Jul 2;300(1):51-9. DOI: https://doi.org/10.1001/jama.300.1.51 PMid:18594040
4. Hamers, R., Wallis, C., Kityo, C., Siwale, M., Mandaliya, K., Conradie, F., Botes, M., Wellington C. HIV-1 drug resistance in antiretroviral-naive individuals in sub-Saharan Africa after rollout of antiretroviral therapy: a multicentre observational study. Lancet Infect Dis, 2011; 11: 750-59. DOI: https://doi.org/10.1016/S1473-3099(11)70149-9
5. Renaud-Théry F, Duncombe C, Kerr S, Thierry S, Perriëns J, editors. Adult antiretroviral therapy in resource limited settings: a systematic review of first-line failure and attrition rates. 17th Conference on Retroviruses and Opportunistic Infections; 2010; San Francisco.
6. Keiser, O., Tweya, H., Braitstein, P., Dabis, F., Phail, P., Boulle, A., Nash, D., Wood, R., Luthi, R., Martin, B., Schechter, M., Egger, M. Mortality after failure of antiretroviral therapy in sub-Saharan Africa. Trop Med Int Health 2010; 15(2): 251-258. DOI: https://doi.org/10.1111/j.1365-3156.2009.02445.x PMid:20003034 PMCid:PMC2873139
7. Ahoua, L., Guenther, G., Pinoges, L. et al. Risk factors for virological failure and subtherapeutic antiretroviral drug concentrations in HIV-positive adults treated in rural North-Western Uganda. BMC Infectious Diseases 2009; 9:81. DOI: https://doi.org/10.1186/1471-2334-9-81.
8. Sungkanuparph, S., Oyomopito, R., Sirivichayakul, S., Sirisanthana, T., Li-Patrick, C. K., Kantipong, P., Christopher, K.C., Kamarulzaman, A., Messerschmidt, L., Law, M.G., Phanuphak, P. HIV-1 Drug Resistance Mutations among Antiretroviral-Naive HIV-1- Infected Patients in Asia: Results from the TREAT Asia Studies to Evaluate Resistance-Monitoring Study. HIV/AIDS, CID 2011(52):1057. DOI: https://doi.org/10.1093/cid/cir107 PMid:21460324

9. Manasa, J., Lessells, R.J., Skingsley, A., Naidu, K.K., Newell, M.N., McGrath, N., de Oliveira, T. High-Levels of Acquired Drug Resistance in Adult Patients Failing First-Line Antiretroviral Therapy in a Rural HIV Treatment Programme in KwaZulu-Natal, South Africa. PLOS ONE 2013; 8(8):1-10. DOI: https://doi.org/10.1371/journal.pone.0072152

10. Datay, M., Boulle, A., Mant, D., Yudkin, P. Associations with Virologic Treatment Failure in Adults on Antiretroviral Therapy in South Africa. J Acquir Immune Defic Syndr 2010; 54:489-495. DOI: https://doi.org/10.1097/QAI.0b0 13e3181d91788 PMid:20395870

11. Matthew P. Fox, Sydney Rosen. Patient retention in antiretroviral therapy programs up to threeyears on treatment in sub-Saharan Africa, 2007-2009: systematic review. Tropical Medicine and International Health. 2010; 15 (suppl. 1): 1-15. DOI: https://doi.org/10.1111/j.1365-3156.2010.02508 .x PMid:20586956 PMCid:PMC2948795

12. Pujades-Roderiguez, M., Balkan, S., Arnould, L. Treatment Failure and Mortality Factors in Patients Receiving Second-Line HIV Therapy in Resource-Limited Countries. JAMA 2010; 304(3): 303-12. DOI: https://doi.org/10.1001/jama. 2010.980 PMid:20639564

13. Pujades-Roderiguez, M., O'Brien, D., Alexandra, C., Pierre, H. Second-line antiretroviral therapy in resource-limited settings-the experience of Medecins Sans Frontieres. Lippincott Williams & Wilkins 2008; 22:1305-12. DOI: https://doi.org/10.1097/QAD.0b013e3282fa75b9

14. Onyedum, C.C., Iroezindua, M.O., Chukwukaa C.J., Anyaeneb C.E., Obic, F.I., Younga, E.E. Profile of HIV-infected patients receiving second-line antiretroviral therapy in a resource-limited setting in Nigeria. Trans R Soc Trop Med Hyg 2013; 10:1-7. DOI: https://doi.org/10.1093/trstmh/ trt071 PMid:23959002

15. Neogi, U., Heylen, E., Shet, A., Chandy, S., Shamsunder, R., et al. Long-Term Efficacy of First Line Antiretroviral Therapy in Indian HIV-1 Infected Patients: A Longitudinal Cohort Study. PLoS ONE 2013; 8(1):1-7. DOI: https://doi.org/10.1371/journal.pone.0055421 PMid:23383185 PMCid:PMC3559582

16. Saini, S., Bhalla, P., Gautam, H., Baveja, U.K., Pasha, S.T., Dewan, R. Resistance-associated mutations in HIV-1 among patients failing first-line antiretroviral therapy. J Int Assoc Physician AIDS Care 2012; 11(3): 203-9. DOI: https://doi.org/10.1177/1545109711421217.

17. Ma, Y., Zhao D., Yu, L., Bultrys, M. et.al. Predictors of virologic failure in HIV-1-infected adults on first line antiretroviral therapy in eight provinces in China. Clin Infect Dis 2010; 50(2): 264-271. DOI: https://doi.org/10.1086/649215