Published in final edited form as:

J Acquir Immune Defic Syndr. 2017 April 15; 74(5): e146–e148. doi:10.1097/QAI.0000000000001258.

HIV and aging: demographic change in the Asia-Pacific region

Rainer Puhr, BSc^{*,1}, Nagalingeswaran Kumarasamy, MD, MBBS, PhD², Penh Sun Ly, MD, MSc³, Oon Tek Ng, MBBS, MRCP, MPH⁴, Kinh Van Nguyen, MD, PhD⁵, Tuti Parwati Merati, MD, PhD⁶, Thuy Thanh Pham, MD, PhD⁷, Man Po Lee, MBBS, MSc, FHKCP, FHKAM, FRCP⁸, Jun Yong Choi, MD, PhD⁹, Jeremy L. Ross, MBBS, MSc¹⁰, and Matthew G. Law, MSc, PhD¹

¹The Kirby Institute, UNSW Australia, Sydney, NSW, Australia ²YRGCARE Medical Centre, Chennai, India ³National Center for HIV/AIDS, Dermatology & STDs, and University of Health Sciences, Phnom Penh, Cambodia ⁴Tan Tock Seng Hospital, Singapore ⁵National Hospital for Tropical Diseases, Hanoi, Vietnam ⁶Faculty of Medicine Udayana University & Sanglah Hospital, Bali, Indonesia ⁷Bach Mai Hospital, Hanoi, Vietnam ⁸Queen Elizabeth Hospital, Hong Kong, China ⁹Department of Internal Medicine and AIDS Research Institute, Yonsei University College of Medicine, Severance Hospital, Seoul, South Korea ¹⁰TREAT Asia, amfAR - The Foundation for AIDS Research, Bangkok, Thailand

Background

Today, an estimated 5.1 million people are living with HIV in the Asia and Pacific region and antiretroviral treatment (ART) coverage more than doubled, from 19% in 2010 to 41% in 2015 [1]. With this rapid scale-up of effective ART, mortality of people living with HIV/AIDS (PLWHA) continues to decrease [2–5]. In addition, age at diagnosis has increased over time [4,6]. Thus, a growing proportion of HIV-positive individuals are now over the age of 50 years [4,7,8].

*Corresponding author: Rainer Puhr, The Kirby Institute, UNSW Australia, Wallace Wurth Building, Sydney, 2052, Australia, T: +61 (0)2 9385 0967, F: +61 (0)2 9385 0940, rpuhr@kirby.unsw.edu.au.

Disclosure statement

Matthew Law has received unrestricted grants from Boehringer Ingelheim, Gilead Sciences, Merck Sharp & Dohme, Bristol-Myers Squibb, Janssen-Cilag, ViiV HealthCare, consultancy and presentation fees from Gilead Sciences, and DSMB sitting fees from Sirtex Pty Ltd.

For the remaining authors none were declared.

TAHOD-LITE study members

PS Ly and V Khol, National Center for HIV/AIDS, Dermatology & STDs, Phnom Penh, Cambodia;
MP Lee, PCK Li, W Lam and YT Chan, Queen Elizabeth Hospital, Hong Kong, China;
N Kumarasamy, S Saghayam and C Ezhilarasi, Chennai Antiviral Research and Treatment Clinical Research Site (CART CRS), YRGCARE Medical Centre, VHS, Chennai, India;
TP Merati, DN Wirawan and F Yuliana, Faculty of Medicine Udayana University & Sanglah Hospital, Bali, Indonesia;
OT Ng, PL Lim, LS Lee and PS Ohnmar, Tan Tock Seng Hospital, Singapore;
JY Choi, Na S and JM Kim, Division of Infectious Diseases, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea;
TT Pham, DD Cuong and HL Ha, Bach Mai Hospital, Hanoi, Vietnam;
KV Nguyen, HV Bui, DTH Nguyen and DT Nguyen, National Hospital for Tropical Diseases, Hanoi, Vietnam;
AH Sohn, JL Ross and B Petersen, TREAT Asia, amfAR - The Foundation for AIDS Research, Bangkok, Thailand;
NL De La Mata, A Jiamsakul, DC Boettiger and MG Law, The Kirby Institute, UNSW Australia, Sydney, Australia.

Widespread consensus exists that HIV and/or its treatment affects the process of adult aging and the development of non-AIDS disorders, including cardiovascular disease, cancer, kidney disease, liver disease, osteopenia or osteoporosis, and neurocognitive disease typically associated with advanced age [9–11]. The demonstrated higher prevalence of such age-associated non-communicable comorbidities among HIV-positive patients over 50 years compared to HIV-negative peers [12], contributes to increased medical complexity of care [11].

To further improve clinical care pathways and to prepare for future challenges of stable older patients on ART it will be essential to estimate the numbers and needs of such patients in care. The aim of this study was to project the likely age distribution of PLWHA at treatment sites in Asia participating in the TREAT Asia HIV Observational Database Low Intensity Transfer (TAHOD-LITE) study to further understand and quantify the changing demographics of HIV and aging at these sites.

Methods

Patient selection

All analyses were based on patients recruited to TAHOD-LITE, an extension of the TREAT Asia HIV Observational Database (TAHOD) [13,14], a member cohort of the International Epidemiology Databases to Evaluate AIDS (IeDEA) global cohort consortium. TAHOD-LITE is an observational cohort study of all HIV-infected patients attending care at eight clinical sites, one each in Cambodia, Hong Kong SAR, India, Indonesia, the Republic of Korea, Singapore, and two in Vietnam. Deidentified data through to May 2014 were transferred electronically to the Kirby Institute at the University of New South Wales, Sydney, Australia for aggregation, quality control and analysis. Core data variables include: sex; date of birth; date of visit; HIV exposure category; hepatitis B virus surface antigen status; hepatitis C virus antibody status; CD4 and CD8 T lymphocyte counts; HIV viral load; ART data; and program outcomes (i.e., death, transfer), date and cause of death.

Ethics approvals were obtained from the Institutional Review Boards (IRBs) at participating sites, the coordinating centre at TREAT Asia/amfAR, and the University of New South Wales Human Research Ethics Committee; written informed consent was obtained if required by the site IRBs.

We included all HIV-positive patients at least 18 years of age who have been receiving care at TAHOD-LITE treatment sites between 2000 and 2014 in our analysis. Patients' data were excluded until the year complete patient sampling for their respective treatment site was available resulting in the following cut-off points: Indonesia and Hong Kong SAR 2003; Cambodia 2004; Singapore 2006; Vietnam 2010. Median CD4 cell counts and HIV viral load measurements were evaluated based on median measurements per patient per year irrespective of treatment status.

Statistical analysis

We calculated yearly age distributions from 2000 to 2013 of the TAHOD-LITE population by age groups of five years, and grouped them from below 18 to 24 years, and 60 years and

older. To project the age distribution of the clinical population into 2025, we estimated yearly mortality by continuously applying a four-year simple moving average to the mortality rates of each age group. We chose the length of the period because all sites report complete data between 2010 and 2013. The yearly lost-to-follow-up rate in each age group was assumed to be constant at the level of 2013 up to and including 2025. This rate included both lost-to-follow-up and transfers to other clinics. For the period 2014 to 2025 we assumed that new patients entered the clinics at the same rate, and with the same age distribution, that was seen in 2013. Given that we only projected using aggregated data by age group, we factored in aging by moving a fifth of patients from every age group to the next every year, except for the group 18–24 years where one seventh of patients was moved, and the group of 60 years and older where no movement to further age groups occurs.

Results

We included 29,112 HIV-positive patients in our analysis. The total number of patients attending care increased from 1,072 at two treatment sites in 2000 to 10,907 in 2010 and 13,314 in 2013 at eight treatment sites. Based on our assumptions, the number of patients attending care in these sites is projected to reach more than 16,000 by 2025. Mean age rose from 32 years (range 18–70 years) in 2000 to 41 years (range 18–86 years) in 2013 and is projected to increase to 45 years by 2025. Overall median CD4 cell counts irrespective of treatment status increased from 296 in 2000 to 417 in 2013 and median HIV viral load decreased from 22,525 in 2000 to 39 in 2013.

The age distribution has substantially changed between 2000 and 2013, and is projected to continue to shift in the coming years (Figure 1). The proportion of patients 50 years of age and older in TAHOD-LITE increased from 2.4% in 2000 to 18.0% in 2013. We estimated that the 50 years and older age group will account for more than 28% of all patients by 2020 and close to 32% in 2025.

To test the robustness of our estimations, we examined the sensitivity to our model assumptions. For example, a yearly two-percent decrease in absolute intake which may occur if sites reached their maximum capacity, resulted in a reduction of total patients of nearly 2,000 compared to the standard model. However, changes in the proportion of patients in the 50 years and older age group remained minimal, increasing to 33% by 2025. On the other hand, an increase in absolute intake by one percentage point each year would increase total patients by about 1,000, but the proportion of people over 50 years would largely stay the same, going from 32% to 31% in 2025. Changing mortality rates to constants also had little influence on numbers and proportions at the end of the projection period. An increase or decrease in lost-to-follow-up rates led to respectively lower and higher total numbers by 2025, but did not change the proportions of the age distribution.

Conclusions

As a consequence of longer survival the number of PLWHA over 50 years of age at treatment sites in Asia is projected to rise substantially by 2025. We estimated that by this time, close to a third of the HIV-positive population in the TAHOD-LITE cohort will be 50

years or older. It is worth noting that the recommendation to treat all is likely to further increase the proportions of age groups presented in this analysis.

Aging populations have already been described in Western and Central Europe and North America where more than half the PLWHA are over 50 years old [6,11]. With further ART roll-out and advances in care, changes in TAHOD-LITE will possibly catch up with trends seen in those regions today.

A major strength of the study was that it includes complete clinic data from all patients seen at each site. However, there are limitations to this study; first and foremost, as we only used data from one or two sites in select countries, results should not be interpreted as representative for whole countries or the entire region. Nonetheless, our study clearly indicates the growth in older populations across all our sites and it seems unlikely that aging patterns would be substantially different in other countries. Secondly, our assumption of a constant age distribution for new patients may not be correct as studies from resource-rich countries indicate increasing age at seroconversion. However, by setting the age distribution of new patients to the 2013 level if anything we are likely to underestimate slightly the proportion of older populations.

With an aging HIV-positive population, expansion of effective ART, and AIDS-defining illnesses becoming increasingly rare in those with HIV-RNA suppression, the burden of chronic diseases associated with aging such as cardiovascular disease and non-AIDS related cancers will likely increase even in resource-limited settings. Our predictions further highlight the need for greater attention to non-communicable disease programs especially in these settings.

Acknowledgments

TAHOD-LITE (TREAT Asia HIV Observational Database Low-Intensity TransfEr) is an initiative of TREAT Asia, a program of amfAR, The Foundation for AIDS Research, with support from the U.S. National Institutes of Health's National Institute of Allergy and Infectious Diseases, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Cancer Institute, National Institute of Mental Health, and National Institute on Drug Abuse as part of the International Epidemiology Databases to Evaluate AIDS (IeDEA; U01AI069907). The Kirby Institute is funded by the Australian Government Department of Health and Ageing, and is affiliated with the Faculty of Medicine, UNSW Australia (The University of New South Wales). The content of this publication is solely the responsibility of the authors and does not necessarily represent the official views of any of the governments or institutions mentioned above.

References

1. UNAIDS. UNAIDS report, Global AIDS update 2016. Jul 3. 2016 Available at: http://www.who.int/hiv/pub/arv/global-AIDS-update-2016_en.pdf
2. Palella FJ, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. N Engl J Med. 1998; 338(13):853–60. [PubMed: 9516219]
3. Antiretroviral Therapy Cohort Collaboration. Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. Lancet. 2008; 372:293–299. [PubMed: 18657708]
4. Han N, Wright ST, O'Connor CC, et al. Australian HIV Observational Database (AHOD); TREAT Asia HIV Observational Database (TAHOD). HIV and aging: insights from the Asia Pacific HIV Observational Database (APHOD). HIV Med. 2015 Mar; 16(3):152–60. Epub 2014 Nov 18. DOI: 10.1111/hiv.12188 [PubMed: 25407085]

5. De La Mata NL, Kumarasamy N, Khol V, et al. Improved survival in HIV treatment programmes in Asia. *Antivir Ther.* 2016 Mar 10;doi: 10.3851/IMP3041
6. Costagliola D. Demographics of HIV and aging. *Curr Opin HIV AIDS.* 2014 Jul; 9(4):294–301. Review. DOI: 10.1097/COH.0000000000000076 [PubMed: 24824889]
7. UNAIDS. HIV and aging, a special supplement to the UNAIDS report on the global AIDS epidemic 2013, July 3. 2016. Available at: http://www.unaids.org/sites/default/files/media_asset/20131101_JC2563_hiv-and-aging_en_0.pdf
8. Liu H, Lin X, Xu Y, et al. Emerging HIV epidemic among older adults in Nanning, China. *AIDS Patient Care STDS.* 2012 Oct; 26(10):565–7. Epub 2012 Sep 17. DOI: 10.1089/apc.2012.0227 [PubMed: 22984779]
9. High KP, Brennan-Ing M, Clifford DB, et al. HIV and aging: state of knowledge and areas of critical need for research. A report to the NIH Office of AIDS Research by the HIV and Aging Working Group. *J Acquir Immune Defic Syndr.* 2012 Jul 1; 60(Suppl 1):S1–18. DOI: 10.1097/QAI.0b013e31825a3668 [PubMed: 22688010]
10. Deeks SG, Lewin SR, Havlir DV. The end of AIDS: HIV infection as a chronic disease. *Lancet.* 2013 Nov 2; 382(9903):1525–33. Epub 2013 Oct 23. DOI: 10.1016/S0140-6736(13)61809-7 [PubMed: 24152939]
11. John M. The clinical implications of HIV infection and aging. *Oral Dis.* 2016 Apr; 22(Suppl 1):79–86. DOI: 10.1111/odi.12473 [PubMed: 27109276]
12. Schouten J, Wit FW, Stolte IG, et al. Cross-sectional comparison of the prevalence of age-associated comorbidities and their risk factors between HIV-infected and uninfected individuals: the AGEHIV cohort study. *Clin Infect Dis.* 2014; 59:1787–1797. [PubMed: 25182245]
13. Zhou J, Kumarasamy N, Ditangco R, et al. The TREAT Asia HIV Observational Database: baseline and retrospective data. *J Acquir Immune Defic Syndr.* 2005 Feb 1; 38(2):174–9. [PubMed: 15671802]
14. The TAHOD-LITE study group. TAHOD-LITE: Antiretroviral Treatment for Adult HIV Infection in Asia, 1998 to 2013. Technical report. 2014. Available at: http://www.amfar.org/uploadedFiles/_amfarorg/Around_the_World/Downloads/TAHOD-LITE-Report.pdf

Figure 1. Numbers (left) and percentages (right) of PLWHA in 5-year age groups in TAHOD-LITE from 2000 to 2013, and projected from 2014 to 2025 with constant intake.