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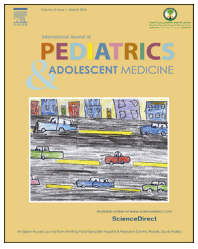

ORIGINAL RESEARCH ARTICLE

Adolescent HIV viral load in an urban hospital in Newark, New Jersey

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KEYWORDS
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Abstract *Background:* Human immunodeficiency virus (HIV) in adolescents is a growing concern. Amid psychosocial challenges, adolescents must successfully transition into adult-centered care; however, little is known about outcome measurements within this period. We assessed the trend in adolescent HIV viral loads (VLs) in a community with a high HIV prevalence, allowing physicians to better recognize the challenges of transitioning adolescents with HIV to adult care.
Methods: All HIV RNA VLs from the Molecular Virology Lab at University Hospital in Newark, New Jersey, from 2007 to 2010 were obtained. Patients were divided into pediatric (<13 years of age), adolescent (13–25 years of age) and adult (>25 years of age) age groups. Univariate and multivariate analyses assessed characteristics of patients by age and gender.
Results: A minimum of 40 pediatric, 178 adolescent, and 1335 adult patients were identified per year. There was a statistically significant increase in VLs of adolescents when compared

Abbreviations: HIV, human immunodeficiency virus; STIs, sexually transmitted infections; AIDS, acquired immune deficiency syndrome; CDC, centers for disease control and prevention; WHO, World Health Organization; VL, viral load; HAART, highly active antiretroviral therapy; ART, antiretroviral therapy; NIH, National Institutes of Health; NCI, National Cancer Institute.

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to pediatric patients ($P < .02$). In 3 of the 4 years, there was a statistically significant increase in the rate of male adolescents reaching undetectable VLs compared to female adolescents. The average VL by age demonstrated increasing VLs from age 12 through age 24, while the percentage of patients reaching undetectable VLs peaked at 80% at age 8 and declined through age 24.

Conclusion: Successful transitional care programs should focus on pediatric needs to address the noticeable decrease in virologic control beginning at 8 years of age and the decreased rate of virologic suppression in females, creating concern for potential gender inequalities and increased risk of vertical transmission.

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1. Introduction

Human immunodeficiency virus (HIV) in the adolescent community is an increasing concern. Globally, there are more than 2 million adolescents living with HIV [1]. Adolescents often engage in high-risk sexual behavior, and individuals aged 15–19 have the highest reported rates of sexually transmitted infections (STIs). Among high school students in 2013, 46.8% have had sexual intercourse, 34% were currently sexually active, and 48.9% of the currently sexually active students did not use a condom the last time they had sexual intercourse. Nationwide, while 85.3% of students had been taught about acquired immune deficiency syndrome (AIDS) or HIV infection in school, only 12.9% of students had ever been tested for HIV [2]. Centers for Disease Control and Prevention (CDC) estimates the 9961 youth aged 13–24 years who were diagnosed with HIV infections in 2013 represents 21% of the total diagnoses that year. Around the same time, there were an estimated 62,400 youth living with HIV infection, with over half undiagnosed [3]. In sub-Saharan Africa, only 10% of young men and 15% of young women aged 15–24 were aware of their HIV status. The World Health Organization (WHO) estimates that adolescent deaths from HIV are rising, which is assumed to be from the lack of support and care that they receive after childhood [1].

During this time, adolescents are facing challenges with their own physical changes, brain development, and social milestones. This period of transition significantly impacts an adolescent's ability to take ownership of their health and successfully enter adult-centered care. In the 2013 CDC HIV Surveillance Report, the lowest percentage of HIV patients to establish linkage of care by age group was persons aged 13–24 years (73.4%) and the lowest percentage to be retained in HIV medical care was persons aged 25–34 years (46.7%) [4]. While many papers and medical organizations recognize the importance of capturing this patient population and preparing them for adulthood, very little has been published regarding outcome measurements of chronic diseases within this phase of adolescent transition. Several programs are being developed to address this very fragile period for young adult health, but understanding the current outcomes in chronic disease during adolescence is necessary for understanding the effectiveness of any transitional care program.

By reviewing the HIV Viral Load (VL) data from University Hospital in Newark, New Jersey, we assessed the trends in adolescent HIV VLs and virologic control in an urban community with a high HIV prevalence. Knowledge of these trends will allow physicians around the world to better recognize the challenges of transitioning young adults with HIV to adult-centered care and identify areas to target in the development of appropriate transitional care programs.

2. Methods

All HIV RNA VLs from the Molecular Virology Laboratory at the University Hospital in Newark, New Jersey, from 2007 to 2010 were obtained. The study received expedited review and approval by the Rutgers New Jersey Medical School Institutional Review Board. Patients were divided into pediatric (age <13 years), adolescent (age 13–25 years), and adult (age >25 years) groups, all of whom were receiving treatment at University Hospital's HIV clinic. The clinic is located in the Francois-Xavier Bagnoud Center and is funded in part by the Ryan White Grant Program. Through social services, the clinic provides access to medication assistance programs, housing programs, and mental healthcare to all patients at point-of-care. Clinic staff consists of two board-certified pediatric infectious diseases physicians, two nurses, one advanced practice nurse, one psychologist, and two social workers. Patients are typically scheduled for 3-month follow-up visits; however, those patients requiring more intense therapy are given more frequent appointments. Most patients were retained in the clinic and were not transitioned out. Over 95% of pediatric patients were infected prenatally and many have grown up attending the clinic. During the time period of the study, all were offered highly active antiretroviral therapy (HAART) with the majority receiving protease inhibitors. Some patients were receiving complex multi-tablet regimes due to multiple past virologic failures with 3-class resistance.

The mean viral load was calculated as the average of each individual's viral load tests over a calendar year. Undetectable viral loads were assigned a value of half the lower limit of detection, and high viral loads were assigned the maximum limit of detection. Undetectable viral loads were defined as <400 copies/mL, which was the most frequent lower limit of detection used in 2001–2008. Patients were considered undetectable if they averaged an

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