

Adolescent Viral Load in an Urban Hospital in Newark, New Jersey 2007-2010

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Background:

Human Immunodeficiency Virus (HIV) in the adolescent community is an increasing concern. Adolescents often engage in high risk sexual behavior, and individuals aged 15 to 19 have the highest reported rates of sexually transmitted infections (STI). Among high school students in 2011, 47% have had sexual intercourse and 40% did not use a condom the last time they had sexual intercourse. 25% of all people with HIV in the United States contracted HIV during their teenage years and in 2009, 39% of new infections were identified in patients age 13-29. 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.

Methods:

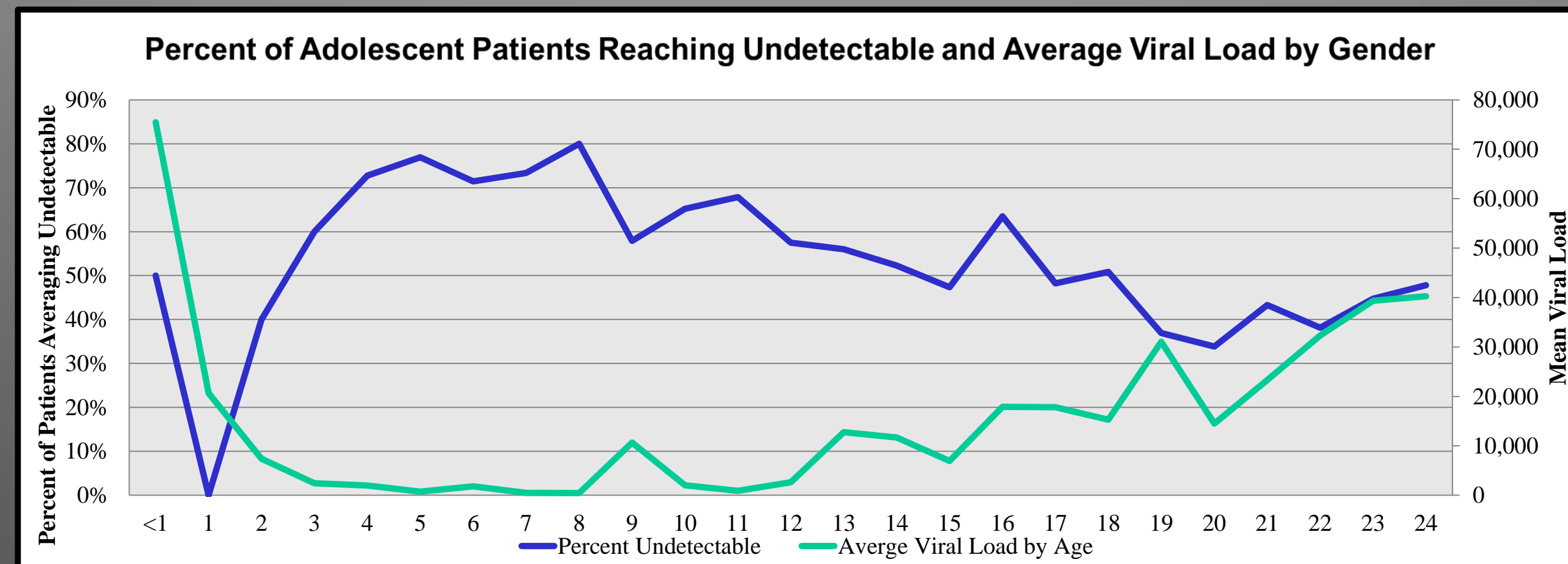
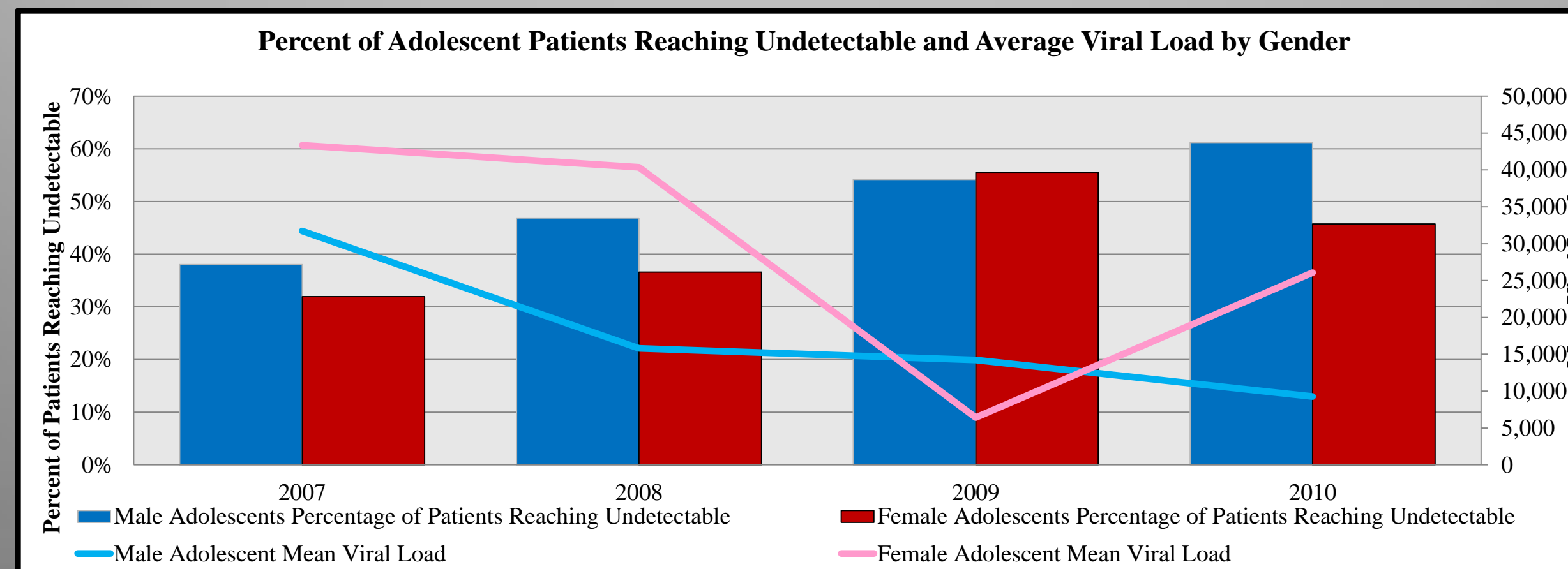
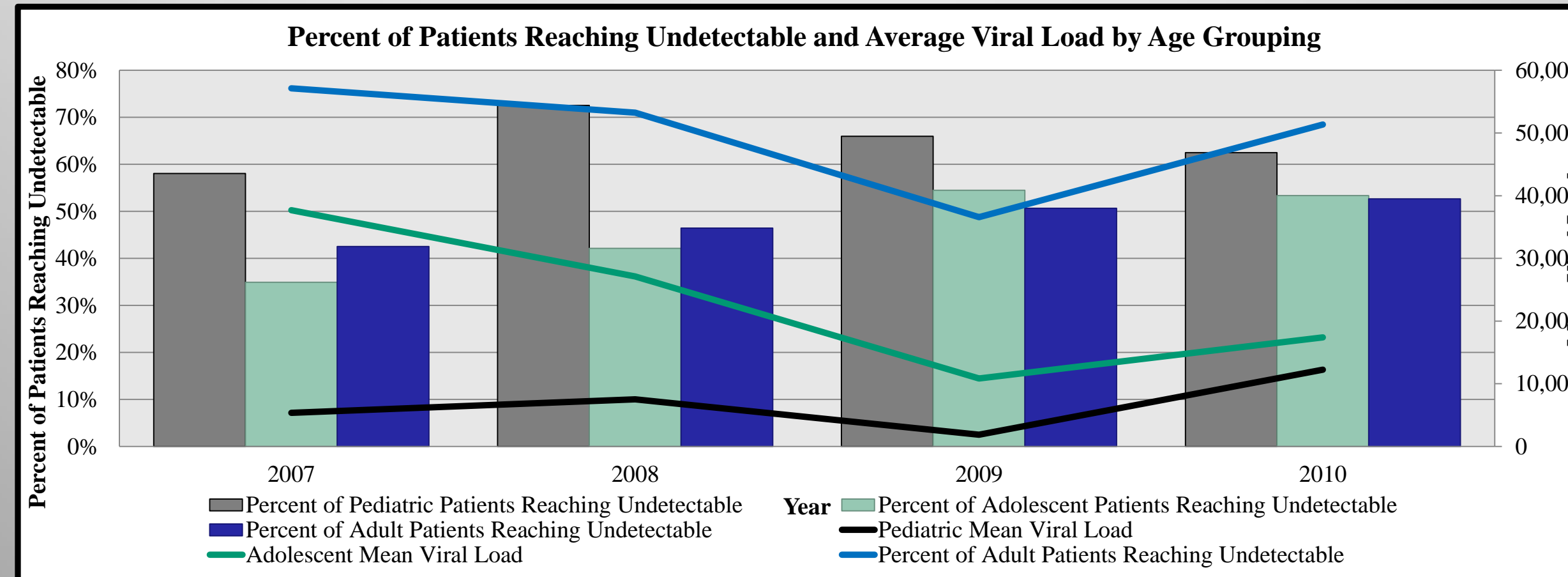
All HIV RNA VL from the Molecular Virology Laboratory at the University Hospital in Newark, New Jersey from 2007-2010 were obtained. Patients were divided into pediatric (age <13), adolescent (age 13-25), and adult (age >25) groups. Mean viral load was calculated as the average of each individual's viral load tests over a calendar year. Patients were considered undetectable if they averaged an undetectable viral load over the calendar year. Univariate and multivariate analyses were done to assess characteristics of patients by age, gender, and race.

Results:

- A minimum of 40 pediatric, 178 adolescent and 1335 adult unique patients were identified per year.
- There was a statistically significant increase in the mean viral load of adolescents when compared to pediatric patients (42% increase, $P < .02$) and in adults when compared to adolescents (195% increase, $P < .0002$).
- The pediatric population had the highest percentage of patient's reaching undetectable. The adolescent group and the adult group were not significantly different over the four years.
- In 3 of the 4 years there was a statistically significant increase in the percentage of male adolescents reaching undetectable VL then female adolescents.
- Average VL by age demonstrates an increasing VL from age 12 through age 24, while the percentage of patients reaching undetectable VL peaks at 80% at age 8 and begins trending down through age 24.

Adolescent Patients By Gender and Year

	2007	2008	2009	2010
Males (Number Undetectable)	92 (35)	96 (45)	107 (58)	98 (60)
Females (Number Undetectable)	97 (31)	82 (30)	81 (45)	94 (43)
Total (Number Undetectable)	189 (66)	178 (75)	188 (103)	192 (103)



Discussion:

Data from University Hospital show evidence of worsening virologic control as patients advance from pediatrics to adolescence and adulthood. Over the four years, the average viral load of pediatric patients was lower than that of the adolescent population which was lower than that of the adult population. While the pediatric population had a significantly lower rate of patient's averaging undetectable viral loads the adolescent and adult populations were not statistically different.

When breaking this down further and examining mean viral load by age from birth to 25 years of age it is notable there is evidence of worsening of virologic control and percentage of patients averaging undetectable. The decrease in adolescent patients reaching undetectable viral load levels are concerning as this coincides with the average age of first sexual activity and could be related to the high rates of new HIV in this age group.

Additionally concerning is that in 3 of the four years examined the adolescent female viral load and female patient's averaging undetectable demonstrated worse virologic control then that of their male counterparts. Given that these are females of potentially child bearing age this could represent a future increase in maternally acquired HIV cases. Newark. While maternally acquired HIV has been dramatically reduced through the use of aggressive screening and treatment scattered cases remain. University Hospital had at least one maternally acquired case of HIV in each year of this data set. The poor virologic control in the adolescent female age group likely contributed to these new infections.

Limitations: These data look at viral loads performed in one lab at one urban university hospital during a four year span. The data are confounded by small sample sizes, particularly in the first few years of life. While the majority of pediatric and adolescent patients in our study have perinatally acquired HIV, we were unable to separate out the small number of behaviorally acquired patients who may have different risk factors and behavior patterns. Additionally we do not account for the increase in efficacious HIV medications and treatment strategies during the time period of this study.

Conclusion:

Pediatric patients develop a noticeable decrease in virologic control as they enter their adolescent years which coincides with the onset of high risk sexual activity. This increased viral load in infected patients puts others at higher risk and may contribute to adolescents having the fastest growing rate of new HIV infections. The decreased rate of virologic suppression in females of child bearing age is additionally concerning as it presents an increased risk of vertical transmission. The development of adolescent HIV clinics, with dedicated services focused on the unique needs of this population, is one potential method of improving virologic control in this high risk group.

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