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Receipt of Clinical and Prevention Services, Clinical Outcomes, and Sexual Risk Behaviors Among HIV-infected Young Adults in Care in the United States

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Abstract

We describe receipt of clinical and prevention services, clinical outcomes and sexual risk behaviors among young adult HIV patients in the United States during 2009-2013, using a sample designed to produce nationally representative estimates. Compared with older HIV patients, proportionately more young adults received provider-delivered prevention services and reported sexual risk behaviors. Young adults had similar care patterns as older HIV patients, but were less likely to have or adhere to an antiretroviral therapy prescription and achieve viral suppression. These estimates establish a national baseline from which to monitor changes in clinical outcomes and transmission behaviors among young HIV-infected adults.

Keywords

HIV; Youth; Young adults; Antiretroviral therapy; Viral load; Health status disparities

Introduction

Youth are substantially affected by HIV. Persons aged 13-24 years represented 21% of all HIV diagnoses in 2013, and 81% of these diagnoses were among those aged 20-24 years, who had the highest number of HIV diagnoses of any age group (Centers for Disease Control and Prevention, 2015). In addition to disparities in HIV diagnoses, HIV-infected persons aged 13-24 years have poorer outcomes than older persons at each step in the HIV care continuum; the Centers for Disease Control and Prevention (CDC) estimates that, in 2011, 49% of all HIV-infected youth were diagnosed, 22% engaged in care, 18% prescribed

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antiretroviral therapy (ART), and only 13% were virally suppressed (Bradley, Hall, et al., 2014).

Considering these sobering statistics and recognizing the unique challenges facing many HIV-infected youth—which include still-developing reasoning and decision-making capacity, ongoing identity formation, and economic instability—some experts have stressed the importance of tailored, youth-focused care and prevention services (Fernandez et al., 2015; Hussen et al., 2015; Zanoni & Mayer, 2014). To inform development and implementation of these services across diverse care settings, we present clinical and treatment characteristics, risk behaviors, and receipt of prevention services among HIV-infected young adults receiving care in the United States. The goals of the National HIV/AIDS Strategy for the United States include improving health outcomes and reducing health disparities and inequities, and call for a specific focus on youth as a highly affected population (Office of National AIDS Policy, 2015). These estimates are the first to our knowledge that establish a national baseline from which to monitor progress toward the goals of improving health and increasing healthy behaviors among young HIV-infected adults.

Methods

We analyzed data from the 2009-2012 cycles of the Medical Monitoring Project (MMP), an HIV surveillance system designed to produce annual nationally representative estimates of behavioral and clinical characteristics of HIV-infected adults receiving medical care in the United States. MMP methods, including weighting procedures and response rates, have been described in detail elsewhere (Blair et al., 2014; Bradley, Frazier, et al., 2014; Bradley et al., 2015). Briefly, the 2009-2012 MMP cycles used a three-stage, probability-proportional-to-size sampling method. First, U.S. states and one territory were sampled, then facilities in those areas providing outpatient HIV care, and finally, eligible HIV-infected patients. Eligible persons were HIV-infected, age 18 years or older, and had received medical care in participating facilities between January and April in the cycle year for which they were sampled. All sampled states and the sampled territory participated in every cycle. The facility response rate ranged from 76-85% and the patient response rate ranged from 49-55%. Interview and medical record abstraction data were collected June 2009 through May 2013. In accordance with the federal human subjects protection regulations ("Protection of Human Subjects, US Federal Code Title 45 Part 46," 2009) and guidelines for defining public health research (Centers for Disease Control and Prevention, 2010), MMP was approved by CDC and determined to be a non-research, public health surveillance activity used for disease control program or policy purposes. If required locally, the participating states, territory, and facilities obtained local institutional review board approval to conduct MMP. Informed consent was obtained from all interviewed participants. Data were weighted on the basis of known probabilities of selection at state or territory, facility, and patient levels (Harding, Iachan, Johnson, Kyle, & Skarbinski, 2013), and then weighted to adjust for non-response (Heeringa, West, & Berglund, 2010; Särndal & Lundström, 2005).

Young adults were defined as individuals aged 18 to 24 years. We analyzed data on 636 young adults participating in MMP, whom we estimate constituted 3% (95% confidence

interval [CI] 3-3) of all HIV-infected adults in care. We used Rao-Scott chi-square tests to compare young adults with adults aged 25 to 90 years on the following characteristics: sociodemographics; health insurance coverage; depression; substance use; sexual behaviors; disease stage; receipt of HIV care and prevention services; and whether they were prescribed and adhered to ART. To assess whether differences in ART use and viral suppression were due to more recent diagnoses among young adults, we examined age differences in these factors among persons diagnosed in the 5 years prior to interview. Because U.S. clinical guidelines for ART prescription used a threshold of CD4 t-lymphocyte counts <500 until 2012, we also examined whether ART prescription differed between age groups among those with nadir CD4 t-lymphocyte counts >=500 and no history of AIDS-defining illnesses in order to assess whether the lower level of ART prescription observed among all young adults was due to less advanced disease in this group compared to older adults.

Results

HIV-infected young adults were less likely than older HIV-infected adults to be white men and more likely to be black men, and more likely to identify as gay or bisexual, to be living in households below the poverty line, to have been recently homeless, recently incarcerated, and uninsured or to have only Ryan White HIV/AIDS Program-funded health care (table 1). Most young adults receiving care (86%) were diagnosed with HIV after 13 years of age, and 75% had been diagnosed for less than 5 years.

Young adult HIV patients were equally as likely as older HIV patients to be depressed, but more likely to binge drink and report drug use (table 2). Young adult patients were more likely to be sexually active and to report having sex without a condom. Almost 1 in 4 reported having condomless sex with a partner of negative or unknown HIV status in the past 12 months, and 13% reported this behavior while not having a suppressed viral load at every test (durable viral suppression) in the same time frame. Young adult patients were more likely to report receiving risk-reduction counseling from a healthcare provider in the past year. Among sexually active HIV patients, young adults were also more likely to have documentation in their medical record of testing for sexually transmitted infections (STIs).

Among HIV patients, young adults had similar care patterns as older patients, approximately ¾ of each group had at least one viral load test in each 6-month period in the year before the interview. However, young adults were less likely to be prescribed ART, and to report currently taking ART and adherence to ART. Approximately 60% of young adults had viral suppression at their most recent test, and only about one-third had durable viral suppression over 12 months. Even among those taking ART, young adults had significantly lower levels of viral suppression compared to older patients. Limiting the analysis to persons diagnosed in the past 5 years, younger adults were still less likely to use ART and have viral suppression than older patients (73% vs. 87%, and 61% vs. 73%, respectively, $p < .01$). Among those with nadir CD4 t-lymphocyte counts >=500, younger adults were also less likely to be prescribed ART (61% vs. 78%, respectively, $p < .01$).

Discussion

MMP data indicate that young adults who received HIV care in the United States from 2009-2012 faced many socioeconomic challenges, with the majority living in poverty and being either uninsured or having only Ryan White HIV/AIDS Program coverage, and a higher proportion than older patients reporting recent incarceration and housing instability. Our estimates of viral suppression among young adult HIV patients fell well below the goal of 80% set by the U.S. National HIV/AIDS Strategy (Office of National AIDS Policy, 2015), indicating the transmission potential from young adults who engage in condomless sex and other transmission behaviors with at-risk partners. These data suggest an urgent public health need for "prevention with positives" efforts among young adults (Centers for Disease Control and Prevention et al., 2014).

Although young adult HIV patients were more likely than older patients to receive provider-delivered risk-reduction counseling and STI testing, they were also more likely to report sexual risk behaviors. Providers may be appropriately focusing risk-reduction efforts on young adults. Nonetheless, STI testing is suboptimal; clinical guidelines recommend annual STI testing for all sexually active persons.

Despite care patterns that are similar to those of older HIV patients, proportionately fewer young adults were prescribed ART, were using ART as prescribed, and had achieved viral suppression, suggesting that efforts to improve engagement in care among young adults may be insufficient. Recent diagnosis did not entirely account for the association of younger age with detectable viral load; even among recently diagnosed patients, young adults were less likely to take ART and have viral suppression. Moreover, clinical decision-making regarding disease stage did not seem to account for the lower proportion of young adult patients prescribed ART. Among patients with high CD4+ t-lymphocyte counts and no history of AIDS-defining illnesses, ART prescription was still more likely for those aged 25 years and older than for younger adults.

Our findings regarding low levels of ART use, prescription, and adherence lend support to the calls of others for tailored interventions to address these issues and more high-quality assessments of the effectiveness of existing interventions (Belzer et al., 2015; Mbuagbaw et al., 2015; Reisner et al., 2009). It may also be beneficial to investigate structural and provider-specific barriers to prescribing ART to young adult HIV patients as well as barriers to the implementation of interventions and care programs for these patients. Federal guidelines for HIV prevention with HIV-positive youth have noted the importance of "youth-friendly" environments and the value of peer navigators, case managers and multidisciplinary teams that can address the multiple needs of this population (Centers for Disease Control and Prevention et al., 2014).

This analysis is subject to limitations. First, confounders, mediators, and effect modifiers of the relationship between age and health outcomes were not assessed. Although this work documents the stark disparities between younger and older HIV patients, a better understanding of the lower prevalence of viral suppression and use of ART in young adult patients is needed to guide service improvement. Second, while the data were adjusted to

minimize nonresponse bias based on known characteristics of nonresponders, the possibility of residual nonresponse bias exists. Third, because MMP has a cross-sectional, observational design, causality cannot be determined. Finally, potentially important differences between perinatally infected and other young adult HIV patients were not assessed (Kahana et al., 2015), as the information that would allow us to measure this was not collected for the majority of the participants included in this analysis, though this may be possible for analyses of data from later MMP cycles.

In conclusion, our work suggests that young adult HIV patients face greater barriers to achieving treatment success than older HIV patients. Although most HIV-infected young adults are undiagnosed or diagnosed but not receiving care (Bradley, Hall, et al., 2014), analyses of the last steps in the care continuum are needed to complement efforts to increase diagnosis and engagement, and are particularly needed among young adults, who our data show are not achieving the same success as older adults once engaged in care. Advances in HIV treatment mean that successfully treated persons have life expectancies equivalent to uninfected persons (May et al., 2014); achieving treatment success among HIV-infected young adults would allow them the opportunity to gain many years of heathy and productive life. Scientists from CDC and the U.S. Department of Health and Human Services have recently published a “call to action” that describes the need for enhanced implementation of effective strategies to address the burden of HIV among young people (Koenig, Hoyer, Purcell, Zaza, & Mermin, 2016). Ongoing monitoring of the clinical and behavioral characteristics of HIV-infected young adults will be critical to our efforts to assess national progress toward meeting the goals of improving health and decreasing HIV transmission from this population.

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Table 1

Selected characteristics of HIV-infected persons receiving medical care, by age group --- Medical Monitoring Project, 2009-2013 (N=18,095)

Characteristics	Age 18-24 (n = 636) n	Age 18-24 (n = 636) Col % (95% CI)	Age 25 or older (n = 22,489) n	Age 25 or older (n = 22,489) Col % (95% CI)	Chi-square *p* value
Race/Ethnicity by gender					<.01
Black, non-Hispanic men	269	43 (37-50)	5,483	25 (21-28)	
Hispanic men	99	14 (10-17)	3,551	14 (12-17)	
White, non-Hispanic men	66	11 (8-14)	6,326	30 (25-34)	
Black, non-Hispanic women	99	15 (11-18)	3,617	16 (14-18)	
Hispanic women	33	5 (3-7)	1,232	5 (4-6)	
White, non-Hispanic women	30	5 (3-7)	965	5 (4-5)	
Men and women, other race/ethnicity	28	5 (3-7)	988	5 (4-5)	
Transgender, all race/ethnicities	12	2 (1-4) *	316	1 (1-2)	
Gay or bisexual identity	377	62 (57-67)	10,994	50 (47-54)	<.01
Education attainment					<.01
< High School	116	19 (15-22)	4,932	21 (19-23)	
High school diploma or GED	225	34 (30-39)	6,037	27 (25-28)	
> High School	295	47 (42-51)	11,509	52 (50-55)	
At or below household poverty level	282	62 (56-66)	7,777	44 (41-47)	<.01
Health coverage or coverage for medications					<.01
Any private insurance	148	25 (20-29)	6,545	31 (28-33)	
Public Insurance only	271	41 (35-47)	12,240	52 (50-54)	
Uninsured or Ryan White program coverage only	206	35 (28-41)	3,640	17 (15-19)	
Homeless	87	14 (10-18)	1,848	8 (7-9)	<.01
Incarcerated	68	11 (8-14)	1,087	5 (5-5)	<.01
Age at HIV diagnosis					
<10 years	89	12 (7-16)	38	<1 (<1-<1)	<.01
10+ years	546	88 (84-91)	22,442	100 (100-100)	
Length of time since HIV diagnosis					
<5 years	461	75 (70-80)	4,265	20 (19-21)	<.01

Characteristics	Age 18-24 (n = 636) n	Age 18-24 (n = 636) Col % (95% CI)	Age 25 or older (n = 22,489) n	Age 25 or older (n = 22,489) Col % (95% CI)	Chi-square *p* value
5-9 years	81	12 (9-15)	4,792	21 (21-22)	
10+ years	93	13 (9-17)	13,423	59 (58-60)	

CI, confidence interval; all percentages are weighted; time period is 12 months prior to interview unless otherwise noted; all variables measured by interview self-report unless otherwise noted;

*coefficient of variation > 0.30, estimate may be unstable.

Table 2

Behaviors and clinical characteristics among HIV-infected adults, by age group -Medical Monitoring Project, 2009-2013

Characteristics	Age 18-24 (n = 636) n	Age 18-24 (n = 636) Column % (95% CI)	Age 25 or older (n = 22,489) n	Age 25 or older (n = 22,489) Column % (95% CI)	Chi-square *p* value
Mental health					
Other or major depression, past 2 weeks†	150	26 (21-30)	4,900	22 (21-23)	0.08
Substance use					
Binge drinking in past 30 days	170	27 (23-32)	3,442	15 (15-16)	<.01
Drug use	263	43 (38-49)	5,750	26 (24-27)	<.01
Stimulant use	57	10 (7-12)	2,212	10 (9-10)	0.89
Sexual behavior					
Sexually active^	534	84 (79-88)	13,791	61 (60-63)	<.01
Sex without a condom^	227	38 (33-43)	5,136	23 (22-25)	<.01
Sex without a condom with a negative or unknown status partner^	146	24 (20-28)	2,464	11 (10-12)	<.01
Sex without a condom with a negative or unknown status partner and no durable viral suppression^	87	13 (11-16)	943	4 (4-5)	<.01
Clinical and treatment characteristics					
HIV disease stage*					
AIDS or nadir CD4 0-199	260	41 (36-45)	15,649	69 (68-70)	<.01
No AIDS and nadir CD4 200-499	310	48 (44-52)	5,210	24 (23-24)	
No AIDS and nadir CD4 >=500	62	11 (8-14)	1,559	7 (7-8)	
Prescribed ART*	508	78 (74-83)	20,742	92 (92-93)	<.01
Currently Taking ART	495	77 (72-81)	20,770	93 (92-93)	<.01
Viral suppression*	381	60 (56-64)	17,219	76 (75-77)	<.01
Durable viral suppression*	244	38 (34-42)	14,420	64 (62-65)	<.01
Had at least one viral load test every 6 months*	460	72 (68-76)	16,623	74 (73-75)	0.30
Adherence and viral suppression among persons taking ART					
Adherent, past 3 days	373	76 (72-80)	17,663	87 (87-88)	<.01
Viral suppression*	360	74 (70-77)	16,816	81 (80-82)	<.01

Characteristics	Age 18-24 (n = 636) n	Age 18-24 (n = 636) Column % (95% CI)	Age 25 or older (n = 22,489) n	Age 25 or older (n = 22,489) Column % (95% CI)	Chi-square *p* value
Durable viral suppression*	227	46 (42-51)	14,103	67 (66-69)	<.01
Receipt of prevention services					
STI/prevention counseling by a health care professional	258	73 (67-79)	5,737	43 (40-47)	<.01
Gonorrhea testing among sexually active*	264	47 (42-51)	4,682	32 (30-35)	<.01
Chlamydia testing among sexually active*	268	48 (43-52)	4,776	33 (30-36)	<.01
Syphilis testing among sexually active*	377	68 (62-74)	8,484	59 (57-61)	<.01

CI, confidence interval; STI, sexually transmitted infections; viral suppression, most recent viral load undetectable or <= 200 copies/ml; durable viral suppression, all viral loads in past 12 months undetectable or <= 200 copies/ml; all percentages are weighted; time period is 12 months prior to interview unless otherwise noted; all measures are self-reported unless otherwise noted;

†measured by Patient Health Questionnaire 8;

^among all persons;

*documented in medical record.