Profile of Puerto Rican HIV/AIDS Patients with Early and Non-Early Initiation of Injection Drug Use

Background: Early initiation of injection drug use (IDU) increases the risk of HIV infection.

Methods: We compare the sociodemographic, psychosocial, and clinical profiles of HIV-positive IDU patients according to the age at which IDU was initiated. This is a cross-sectional study of 1308 patients seen from 1992 through 2005. We compared the profile of patients with early (age <13 years) vs non-early (age >13 years) initiation of IDU. The Fisher and χ^2 differences in proportions were performed to assess difference among study groups with earlier IDU. The Mantel-Haenszel test was used to calculate the odds ratio. The Kaplan-Meier and log rank tests were used to assess the median survival. Differences were considered significant at $\alpha = .05$.

Results: Early initiation of IDU was reported in 11% of our sample. The early initiation group was more likely to smoke tobacco, use alcohol, attempt suicide, have a history of incarceration, have economic problems, and have episodes of anxiety, confusion, depression, excitation, impulsivity, and violence ($P<.05$). The general survival time of patients was 36.9 months (95% confidence interval 31.9–42.0). A higher prevalence of candidial esophagitis and *Pneumocystis jirovecii pneumonia* and a lower prevalence of hepatitis C virus co-infection were seen in the early initiation group ($P<.05$). No differences in mortality, use of antiretroviral therapy, or CD4 T-cell count were seen.

Conclusions: Differences in terms of lifestyle, stress factors, and history of psychological events were seen in the group of patients with early initiation of IDU seen in our facilities. Differences in the clinical scenario were documented. (*Ethn Dis*. 2008;18[Suppl 2]:S2-99–S2-104)

Key Words: Early Initiation IDU, Puerto Ricans, HIV/AIDS, Psychosocial, Stress Factors

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Introduction

The use of illicit drugs is a serious public health problem in Puerto Rico.[1–7] The geographic location of Puerto Rico, along with its political association with United States, makes the island a major point of entry for illicit drugs destined for the mainland. The corrosive effects of injection drug use (IDU) are well documented.[8,10,12,21–23]

Early initiation in the use of illicit drugs increases the risk of subsequent drug abuse and drug dependence. Additionally, mental health disorders are associated with drug dependence.[6,8–12,22–23] Studies focusing on the factors and scenarios associated with early IDU are essential to construct more effective preventive measures, which may ameliorate the ravaging effects of IDU and its associated comorbidities in early users.

Adolescence is characterized by physical and emotional changes that expose adolescents to psychosocial pressures that may contribute to the engagement in HIV high-risk behaviors.[2,6,8–12] Studies that associate initiation of drug abuse in adolescence with circumstances such as family problems, homelessness, disturbing events, abuse, and economic problems are well documented.[9–12] The antecedent of adolescent criminal behavior and use of non-injection drugs abuse has been found to be present in the older injection drug abusers.[9–11] Early initiation of drug use increases vulnerability to sexually transmitted diseases risk of HIV infection.[2,6,9–11] The combination of individual, societal, environmental and biologic factors associated with the early initiation of drug use in adolescence needs to be carefully evaluated, considering the clear risk of subsequent problems, including the continued exposure to more intense and more dangerous risk practices.[2–3,9–12,21–23]

IDU continues to be a prevalent high-risk behavior among Puerto Ricans with HIV/AIDS; nearly 50% of all reported cases in Puerto Rico are linked to IDU.[3–7,13,21] In comparison to the rest of the United States and Caribbean, Puerto Ricans have a higher incidence of IDU-related HIV/AIDS.[3–7,13,21] Early initiation of drug abuse and sexual activity increases the probability of HIV infection, hepatitis C virus infection, and sexually transmitted diseases.[8–12,14–15,21] Studying early vs later initiation of IDU in a cohort of HIV patients, focusing on differences on the sociodemographic, psychosocial, and clinical spectrum of disorders, will help to develop more effective interventions to diminish the spread of HIV and comorbidities directly or indirectly associated with IDU.

Methods

This is a cross-sectional study of HIV patients followed at the Retrovirus Research Center of the Universidad Central del Caribe School of Medicine, conducted from 1992 through 2005. The patients were recruited from an ambulatory HIV immunologic clinic and the Ramón Ruiz Arnaú University

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Hospital, both part of the Bayamón Health Region and administered by Puerto Rico Health Department. Data were collected via an interview using a structured questionnaire that gathered information regarding sociodemographic variables, HIV risk exposure, family background, lifestyle issues, major stressful events, and substance abuse profile. The medical record was consulted to complete clinical data, immunologic parameters, and therapy variables, including antiretroviral therapy. Mortality data were obtained from review of medical records, Puerto Rico AIDS Surveillance System, and Mortality Registry of the Puerto Rico Health Department. Mortality was calculated as the time from entry into our healthcare system until death. The AIDS-defining conditions recorded follow the Guidelines of Revision of Classification of AIDS published by the Centers for Disease Control and Prevention in 1993.[16] Follow-up interviews were scheduled at six-month intervals after the initial encounter. All patients were informed of the study in detail, and informed consent was obtained at study entry; participation was voluntary. This study was approved by the institutional review board of the Universidad Central del Caribe School of Medicine. All patient-identifying information were kept confidential.

Early initiation of IDU was defined as initiating IDU on or before 13 years of age.[8–9,25,26] We selected this age cutoff on the basis of the recognition that this age marks the transition from a preadolescent to the adolescent stage of human development.[8–12,24–26]

The sociodemographic variables evaluated included age at study entry, sex, education level, professional status, living with or without family, having a partner, and having children. The lifestyle and stress factors included any history of smoking tobacco, alcohol abuse, suicide attempt, incarceration, isolation, and antisocial behavior. The following variables were considered if

they had occurred in the year before the interview: economic problems, death of a close friend or relative, conflict with a close friend or relative, change of address, and constant family fights. Psychosocial events measured during the past year included episodes of anxiety, confusion, depression, excitation, impulsivity, and violence. Clinical parameters included variables such as HIV status of patient at enrollment, most recent CD4 T-cell counts, AIDS-defining condition[16] (candidial esophagitis and *Pnemocistis jirovecii* pneumonia) at study entry, co-infection with hepatitis C virus, and survival time .

The power estimation was calculated by using published data on the HIV-infected IDU population in Puerto Rico.[22] Considering the ratio of late to early initiation of IDU, the sample size in our study was sufficient to detect significant differences between groups at .88 (OR 1.88). Thus the associations and comparison in the study will have a statistical power of 90% or higher.[27–28] Fisher exact test and χ^2 differences in proportions were performed to assess potentially significant differences. The Mantel-Haenszel test was used to calculate the odds ratio (OR) for psychosocial and clinical variables for the two groups. The Kaplan-Meier procedure was used to assess the median survival. The survival was compared by using the log rank test. Differences were considered significant at $\alpha=.05$. The statistical packages used were SPSS 14.0 for Windows (SPSS, Inc., Chicago, Ill) and STATA Intercooled 9.00 (Stata-Corp, LP, College Station, Texas).

RESULTS

Of the 1308 HIV-infected IDU patients, 143 (11%) self-reported initiation of this risk behavior before 13 years of age, and 1165 were non-early initiation users.

The proportion of early initiation IDU decreased in 1998–2005 com-

pared with 1992–1997 ($P<.05$) (Table 1). Our data reveal similar proportions in the early initiation IDU group when compared with the non-early initiation group in terms of the main sociodemographic variables: most were male (84.6% vs 83.6%), and the mean age at initial clinical encounter was 36.0 years and 36.8 years, respectively. More than 75% of patients in both groups did not complete high school, and most reported not having a partner. Employment status was similar between groups, although slightly more early initiation users were employed (10.4% vs 8.7%). More early initiation users lived without family (50.5%) than did non-early users (46.8%).

Early initiation IDU were more likely to have a history of smoking tobacco (100% vs 91.5%), use of alcohol (65.9% vs 51.5%), suicide attempts (36.8% vs 25.7%), and incarceration (79.7% vs 65.4%) (Table 2). Early initiation IDU were slightly more likely to have a history of antisocial behavior. Early initiation users reported more economic problems (20% loss of income), death of a close friend or relative, conflict with a close friend or relative, change of address, and constant family fights. More early initiation users reported episodes of anxiety, confusion, depression, excitation, impulsivity, and violence.

A slightly higher proportion of non-early initiation users had immunologic AIDS at first contact (52.6% vs 48.3%), although clinical AIDS was more frequently seen in the early initiation IDU (33.6% vs 23.5%). A CD4 T-cell counts <200/µL was more often observed among early initiation IDU than among non-early initiation IDU (44.0% vs 42.3%). When compared to the non-early initiation IDU, more early initiation IDU had candidial esophagitis and *Pneumocystis jirovecii* pneumonia at their initial evaluation at our center (15.4% vs 7.0% and 14.0% vs 8.0, respectively) ($P<.05$). Hepatitis C virus co-infection was less common

Table 1. Sociodemographic characteristics of Puerto Rican HIV/AIDS patients: early initiation IDU vs. non-early initiation IDU

Characteristic	Early initiation IDU		Non-early initiation IDU	
	n	%	*n*	%
Entry year*				
1992–1997 (*n*=846)	114	13.5	732	86.5
1998–2005 (*n*=462)	29	6.3	433	93.7
Sex				
Male	121	84.6	974	83.6
Female	22	15.4	191	16.4
Education				
Less than 12th grade	105	77.2	848	75.6
12th grade or higher	31	22.8	274	24.4
Employment status				
Unemployed	121	89.6	1022	91.3
Employed	14	10.4	97	8.7
Live with family				
Yes	45	49.5	432	53.2
No	46	50.5	380	46.8
Have partner				
Yes	32	23.5	279	24.7
No	104	76.5	852	75.3
Have children				
Yes	80	61.5	710	65.2
No	50	38.5	379	34.8
Mean age at study entry, years	36.0 (SD 7.0)		36.8 (SD 7.6)	

IDU = injection drug use, SD = standard deviation.
* *P* value <.05.

Table 2. Lifestyle, stress, and psychosocial events of Puerto Rican HIV/AIDS patients: early initiation IDU vs. non-early initiation IDU

Variable	Early initiation IDU		Non-early initiation IDU		OR	(95% CI)
	n	%	*n*	%		
History of						
Smoking tobacco*	91	100.0	720	91.5	—	—
Alcohol use*	56	65.9	394	51.5	1.81	(1.13–2.92)
Suicide attempt*	28	36.8	178	25.7	1.69	(1.03–2.78)
Incarceration*	63	79.7	464	65.4	2.08	(1.17–3.69)
Isolation	38	50.0	303	44.7	1.24	(0.77–1.99)
Antisocial behavior	45	63.4	423	61.7	1.07	(0.65–1.77)
Stress event during past year						
Economic problems*	43	57.3	252	37.1	2.28	(1.39–3.71)
Death of close person*	30	40.5	196	28.8	1.68	(1.03–2.76)
Conflict with close person*	28	37.3	168	24.8	1.80	(1.09–2.98)
Change of address	46	62.2	356	51.4	1.56	(.95–2.55)
Constant family fights*	18	24.3	72	10.7	2.69	(1.49–4.85)
Psychological episode						
Anxiety*	75	93.8	518	73.4	5.44	(2.15–13.81)
Confusion*	54	74.0	370	53.9	2.43	(1.40–4.19)
Depression*	73	91.3	534	75.0	3.48	(1.56–7.73)
Excitation*	38	52.1	171	25.0	3.25	(1.97–5.35)
Impulsivity*	53	74.6	356	52.2	2.69	(1.54–4.72)
Violence*	37	50.7	179	26.3	2.88	(1.75–4.72)

IDU = injection drug use, OR = odds ratio, CI = confidence interval.
* *P* value <.05.

Table 3. Clinical status of Puerto Rican HIV/AIDS patients: early initiation IDU vs. non-early initiation IDU, 1992–2005

Clinical parameter	Early initiation IDU		Non-early initiation IDU		OR	(95% CI)
	n	%	*n*	%		
Status at enrollment*						
HIV infection (no AIDS)	69	48.3	613	52.6		
Immunologic AIDS	26	18.2	278	23.9		
Clinical AIDS	48	33.6	274	23.5	——	——
CD4 T-cell count/μL						
<200	44	44.0	371	42.3	.93	(.61–1.41)
≥200	56	56.0	507	57.7		
Candidial esophagitis*	22	15.4	81	7.0	2.43	(1.46–4.05)
Pneumocystis jirovecii pneumonia*	20	14.0	93	8.0	1.87	(1.11–3.15)
Hepatitis C virus coinfection*	23	16.1	294	25.2	.57	(.36–.91)
Antiretroviral therapy	19	13.3	193	16.6	.77	(.46–1.28)
Mortality						
Alive	68	47.6	603	51.8	1.18	(.84–1.68)
Dead	75	52.4	562	48.2		

IDU = injection drug use, OR = odds ratio, CI = confidence interval.
* *P* value <.05.

among early initiation IDU than among non-early initiation IDU (16.1% vs 25.2%) (*P*<.05). Fewer early initiation IDU patients (13.3%) used antiretroviral therapy than did non-early initiation IDU (16.6%), although this difference did not reach significance. More early initiation IDU had died by the end of the study period (52.4% vs 48.2%) (*P*=.37), and the average survival time of patients was 36.9 months (95% confidence interval 1.9–42.0 months). Figure 1 shows no survival differences between the groups, although the estimated median survival was shorter among early initiation IDU (29.4 months vs 37.6 months, respectively) (*P*=.56).

DISCUSSION

The general sociodemographic profile of HIV-infected Puerto Rican IDU shows a large proportion of males, with a low level of education, high unemployment, and children but no partner and living with relatives.[5–6,22] IDU has a major effect on family relationships and increases the spectrum of vulnerabilities and risks of co-morbidities associated with HIV. Our study suggests that early initiation of this practice may
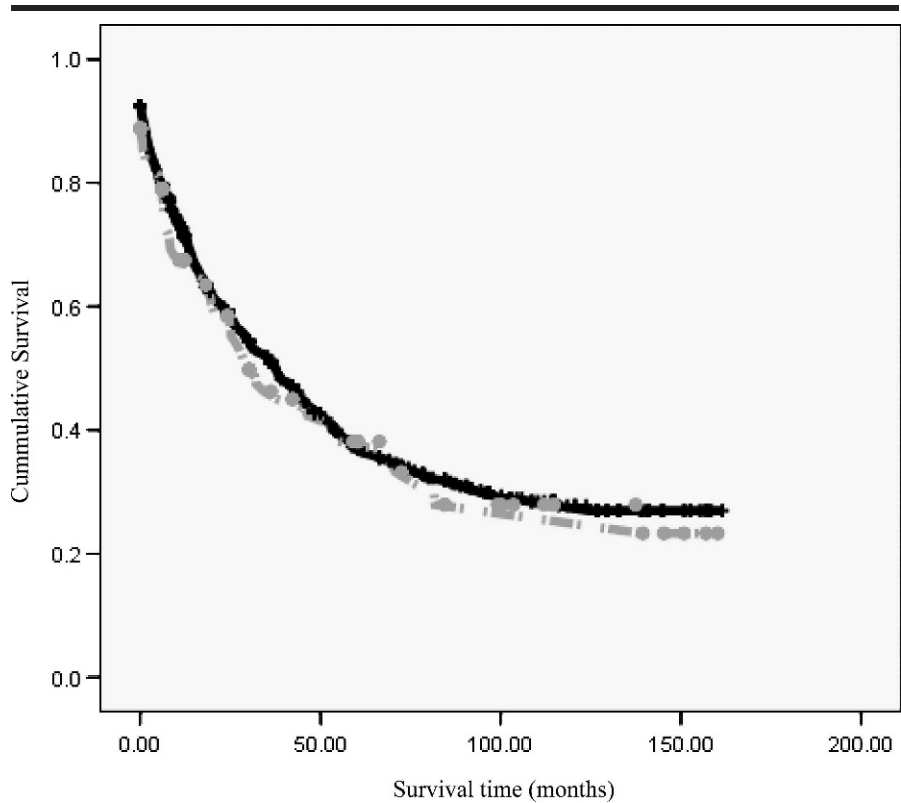

Fig 1. Survival of Puerto Rican HIV/AIDS cohort of patients with early initiation IDU as initial risk factor compared with non-early initiation IDU: 1992–2005 (*N*=1308) Dotted line = precocious IDU (*n*=143); solid line = non-precocious. IDU Dotted line = Early initiation IDU (*n*=143); solid line = non-early initiation IDU (Reviewed). Early initiation IDU: median 29.47 months (95% CI 17.65–41.29); Non-early initiation IDU: median 37.68 months (95% CI 32.58–42.79); Log rank *P*=.525. IDU = injection drug use, CI = confidence interval.

produce an even wider spectrum of psychosocial and psychological problems, additional risk factors, and more difficult clinical manifestations.[8–11,15,17,21–24,26]

One of the consistent findings in our study is the high proportion of psychological and stress events associated with early initiation of IDU.[22–24,26] Our findings are consistent with those of other studies.[8,10–11,21–22,24] Unstable and difficult family relationships, economic hardship, and conflict with close friends and relatives characterize the group of early initiators, and these factors continue well into adulthood. Antisocial behaviors will prevent rehabilitation of many of the individuals in the early initiation group.[9–12,22–24,26]

The higher prevalence of clinical AIDS in the early initiation group, along with the higher prevalence of opportunistic infections and slightly higher mortality, may suggest a more deteriorated immune system and perhaps HIV infection at an earlier age. Our data suggest that both groups arrive at our health center at a similar age; thus, early infection with the virus along with a delay in initiating antiretroviral therapy may explain the more deteriorated immunological condition.

Patients with early IDU initiation may not only escalate in the use of drugs but also in other risky practices. To address this complexity, intervention research needs to test strategies designed to alter specified modifiable mediators that may be effective in reducing early drug use initiation and escalation.[17–20] As noted in National Institute of Drug Addittition policies, drug use, abuse, and dependence often co-occur with delinquency and criminal behavior, violence, mental health problems, and HIV; therefore, preventing co-occurring problems and their contribution to elevated levels of risk is essential.[17–20] Our findings suggest the need for primary interventions to manage the behavioral problems that originate in childhood.[17,19–20] Prevention programs should emphasize family char-acteristics and susceptibility to peer norms.[8–10,19–20]

Implications for Improving Health Disparities

To reduce health disparities, a holistic and multidisciplinary approach including intervention programs with early adolescents must be implemented. A system to monitor the vulnerable and high-risk groups should be implemented with education programs focused on safety behaviors.[19–20]

The limitations of the study include that these psychosocial data are self-reported and may thus be subject to recall bias.

REFERENCES

1. Office of National Drug Control Policy. Puerto Rico: Profile of drugs indicators. Rockville (Md): Drug Policy Information Clearinghouse; 2004.
2. Administración de Servicios de Salud Mental y Contra la Adicción. El uso de substancias en los escolares puertorriqueños. Consulta juvenil VI 2002–2003 al 2003–2004. San Juan (Puerto Rico): Universidad Central del Caribe; 2004.
3. Joint United Nations Programs on HIV/AIDS (UNAIDS). World Health Organization/ United Nations Programme on HIV/AIDS. AIDS epidemic update 2005. Available at http://unaids.org. Accessed 2/1/2006.
4. ASPIRA National Office. Puerto Ricans in the United States and the AIDS epidemic. Available at http://www.aspira.org/HIV/Puerto_Ricans_and_AIDS.pdf. Accessed 1/22/2007.
5. Báez-Feliciano DV, Thomas JC, Gómez MA, et al. Changes in the AIDS epidemiologic situation in Puerto Rico following health care reform and the introduction of HAART. Pan Am J Public Health. 2005;17(2):92–100.
6. Fernández DM, Gómez MA, Figueroa W, et al. A comparison of the sociodemographic, risk-behavior and substance-abuse profile of young vs older HIV-infected Puerto Rican AIDS patients. Ethn Dis. 2005;15(4 Suppl 5):25–29.
7. Estado Libre Asociado de Puerto Rico, Departamento de Salud, Oficina Central para Asuntos del SIDA y las Enfermedades de Transmisión Sexual, Programa de Vigilancia del SIDA en Puerto Rico. Casos de SIDA Confirmados a Diciembre de 2005. San Juan (Puerto Rico): Secretaria Auxiliar de Promoción y Protección de Salud; 2006.
8. Pinazo Hernandis S, Pons Diez J, Carreras Rouma A. El consumo de inhalables y cánnabis en la preadolescencia: análisis multivariado de factores predisponentes. Anales de Psicología. 2002;18(1):77–93.
9. Kokkevi A, Gabhainn SN, Spyropoulou M. Early initiation of cannabis use: a cross-national European perspective. J Adolesc Health. 2006;39:712–719.
10. Miller CL, Strathdee SA, Kerr T, Li K, Wood E. Factors associated with early adolescent initiation into injecting drug use: implications for interventions programs. J Adolesc Health. 2006;38(4):462–464.
11. Fuller CM, Vlahov D, Arria AM, Ompad DC, Garfein R, Strathdee SA. Factors associated with adolescent initiation of injection drug use. Public Health Rep. 2001;116(1):136–145.
12. Rossenthal SL, Von Ronson KM, Cotton S, Biro FM, Mills L, Succop PA. Sexual initiation: predictors and developmental trends. Sex Transm Dis. 2001;28(9):527–532.
13. Centers for Disease Control and Prevention. HIV/AIDS surveillance report. Cases of HIV infection and AIDS in the United States, 2005. Available at http://www.cdc.gov/hiv/topics/surveillance/resources/reports/2005report/pdf/2005SurveillanceReport.pdf. Accessed 1/19/2006.
14. Centers for Disease Control and Prevention. Trends in HIV-related risk behaviors among high school students—United States, 1991–2005. MMWR. 2006;55(31):851–854.
15. Duncan SC, Strycker LA, Duncan TE. Exploring associations in developmental trends of adolescent substance use and risky sexual behavior in a high-risk population. J Behav Med. 1999;22(1):21–34.
16. Centers for Disease Control and Prevention. Revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR. 1993;41(RR-17):1–19.
17. Booth RE, Kwiatkowski CF, Mikulich-Gilbertson SK, et al. Predictors of risky needle use following interventions with injection drug users in Ukraine. Drug Alcohol Depend. 2006;82(1):S49–S55.
18. Held GA. Linkages between substance abuse prevention and other human services—part A. National Institute on Drug Abuse, National Institutes of Health. Available at http://www.

drugabuse.gov/about/organization/despr/hsr/da-pre/HeldLinkagesPartA.html. Accessed 1/19/2007.

19. Wainberg MA. The need to promote public health in the field of illicit drug use. *CMAJ*. 2006;175(11):1395–1396.

20. Wood E, Tyndall MW, Montaner JS, Kerr T. Summary of findings from the evaluation of a pilot medically supervised safer injecting facility. *CMAJ*. 2006;175(11):1395–1404.

21. Straussner L. The impact of alcohol and other drug abuse on the American family. *Drug Alcohol Rev*. 1994;13(4):393–399.

22. Reyes JC, Robles RR, Colón HM, et al. Severe anxiety symptomatology and HIV risk behavior among Hispanic injection drug users in Puerto Rico. *AIDS Behav*. 2007;11:145–150.

23. Committee on Pediatric AIDS. Reducing the risk of HIV infection associated with illicit drug use. *Pediatrics*. 2006;117:566–571.

24. Arseneault L, Cannon M, Poulton R, Murray R, Caspi A, Moffit TE. Cannabis use in adolescence and risk for adult psychosis: longitudinal prospective study. *BMJ*. 2007;325(7374):1212–1213.

25. Papalia DE, Wendkos S, eds. *Human Development*. Bogotá, Colombia: McGraw-Hill; 1997.

26. O'Donnell L, O'Donnell CR, Stueve A. Early sexual initiation and subsequent sex-related risks among urban minority youth: the reach for health study. *Fam Plann Perspectives*. 2001;33(6):268–275.

27. Gordis L. Estimating risk: is there an association? In: *Epidemiology*. 3rd ed. Elsevier Inc., 2004:186–187.

28. STATA Release 9. Tables for epidemiologists. In: *Survival Analysis and Epidemiological Tables*, StataCorp LP ed. Stata Press, 2005:21–75.