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Race and Sex Differences in HAART Use and Mortality among HIV-infected Persons in Care

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Abstract

Background: There are conflicting data regarding possible race and sex differences in mortality of HIV+ persons. We studied all-cause mortality over 8 years among persons in care during the HAART era.

Methods: This retrospective cohort study included all patients in care (> 1 visit) at the Comprehensive Care Center (Nashville, TN) between Jan 1998-Dec 2005. Healthcare was available to all HIV+ Tennesseans during the study period. Proportion of time in care on HAART was days on HAART divided by total days in care. Fishers Exact and ranksum tests compared baseline characteristics and HAART use during follow-up. Cox regression models examined factors associated with time to death.

Results: Of 2,605 study patients (6,657 person-years (p-y) of follow-up), median age was 38 years; 38% were black, 24% female, and 12% had a history of injection drug use (IDU). Overall mortality was 38 deaths per 1000 p-y. Median CD4 at presentation was lower in blacks than non-blacks (304 vs. 336, P=0.003) and higher in females than males (366 vs. 312, P<0.01). Proportion of time in care on HAART was less for blacks than non-blacks (47% vs. 76%, P<0.01) and females than males (57% vs. 71%, P=0.01). These relationships held when limited to persons with baseline CD4<200. Loss to follow-up did not differ by race or sex. Crude all-cause mortality was higher in blacks than non-blacks (49 vs. 31 deaths per 1000 p-y; HR 1.6, P<0.01), but similar for females and males (41 vs. 37 deaths per 1000 p-y; HR 1.1, P=0.47). In a multivariate analysis adjusting for characteristics at 1st visit (CD4, CD4%, HIV-1 RNA, current or prior AIDS diagnosis, age, and prior ART use), death was associated with black race (HR 1.3, P=0.04), female sex (HR 1.5, P=0.06), IDU (HR 1.7, P=0.03), AIDS diagnosis (HR 1.5, P=0.02), older age (HR 1.03 per year; P<0.01), and lower CD4 (HR 0.8 per 100 cell increase; P<0.01). After including proportion of time in care on HAART, black race (HR 1.04; P=0.81) and IDU (HR 1.4; P=0.07) were no longer associated with death, but female sex was (HR 1.5; P=0.07).

Conclusions: Among HIV+ persons in care, blacks and females received less HAART than whites and males, respectively. There were race differences in mortality, likely due to differences in HAART use. Adjusting for characteristics at presentation, women had an increased risk of death even after adjusting for HAART use. Addressing survival disparities will require increased HAART utilization in blacks; the risk of death in women requires further study.

Background

- CDC data for all persons in the US with AIDS consistently demonstrate poorer long-term survival for black patients (1). In the pre-HAART era, however, a study of HIV progression and survival at a single urban center found no significant demographic differences in mortality (2).
- Several studies have found that HIV+ women and blacks are less likely to receive HAART than HIV+ men and whites, respectively (3,4).
- After the introduction of HAART, national Black-White mortality disparities widened significantly, especially among women and the elderly (5).
- These survival differences may be attributed to disparities in access to medical care; it remains unclear whether sex and race differences in survival exist for patients established in care.

Methods

- The study population included all patients who established care and had at least one provider visit at the Comprehensive Care Center in Nashville, TN between January 1, 1998 and December 31, 2005.
- During the study period, healthcare coverage was available through TennCare (Tennessee's Medicaid managed care program) to virtually all Tennesseans identified as HIV+ (6).
- Follow-up time was calculated from the first clinic visit date. Subjects were censored at the time of death, or December 31, 2005, or at the last visit for all individuals with no visit in ≥ one year.
- The proportion of time in care on HAART was defined as total days on HAART divided by total days in care (first visit to end of follow-up period, as defined above). Laboratory data and antiretroviral therapy were validated by systematic chart review.

Results

- 2,605 patients met the inclusion criteria; median follow-up 2.03 years
- 989 (38%) blacks, 1,616 (62%) non-blacks
- 617 (24%) women and 1,988 (76%) men
- Overall mortality rate: 38 deaths per 1000 person-years (253 deaths)

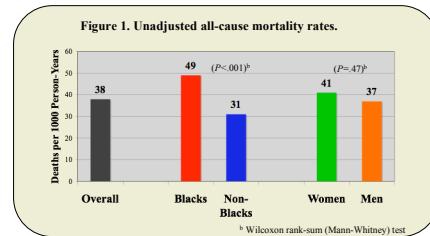


Table 1. Clinical and demographic characteristics by race

Characteristics	Black (n = 989)	Non-Black (n = 1,616)	P Value
Female sex (%)	316 (32.0)	301 (18.6)	<0.001 ^a
Age at first visit, median (IQR) ^b , years	37.9 (30.6-44.4)	37.4 (31.5-43.0)	0.40 ^b
IVDU as HIV risk factor (%)	139 (14.1)	169 (10.5)	0.007 ^c
Baseline CD4+ lymphocyte count, median (IQR), cells/mm ³	304 (134-494)	336 (154-533)	0.003 ^b
Baseline HIV-1 RNA level, median (IQR), log ₁₀ copies/mL	4.4 (3.4-5.0)	4.3 (2.9-4.9)	0.002 ^b
AIDS diagnosis prior to first visit (%)	88 (8.9)	180 (11.1)	0.07 ^c
ART/HAART exposure prior to first visit (%)	282 (28.5)	692 (42.8)	<0.001 ^a
ART exposure prior to HAART initiation (%)	56 (5.7)	70 (4.3)	0.13 ^b
Time to HAART initiation ^d , median (IQR), days	21 (0-113)	9 (0-51)	<0.001 ^b
Time in care, median (IQR), days	769 (197-1577)	717 (230-1483)	0.75 ^b
Proportion of time in care on HAART, median (IQR), %	46.9 (0-94.5)	75.8 (0-98.9)	<0.001 ^b

Table 2. Clinical and demographic characteristics by sex

Characteristics	Female (n = 617)	Male (n = 1,988)	P Value
Black race (%)	316 (51.2)	673 (33.9)	<0.001 ^a
Age at first visit, median (IQR) ^b , years	35.4 (28.4-42.6)	38.2 (32.1-43.4)	<0.001 ^b
IVDU as HIV risk factor (%)	77 (12.5)	231 (11.6)	0.57 ^c
Baseline CD4+ lymphocyte count, median (IQR), cells/mm ³	366 (192-576)	312 (135-506)	<0.001 ^b
Baseline HIV-1 RNA level, median (IQR), log ₁₀ copies/mL	4.1 (2.9-4.8)	4.4 (3.2-5.0)	<0.001 ^b
AIDS diagnosis prior to first visit (%)	39 (6.3)	229 (11.5)	<0.001 ^a
ART/HAART exposure prior to first visit (%)	208 (33.7)	766 (38.5)	0.03 ^c
ART exposure prior to initiation of HAART (%)	42 (6.8)	84 (4.2)	0.01 ^b
Time to HAART initiation ^d , median (IQR), days	16 (0-82)	14 (0-67)	0.14 ^b
Time in care, median (IQR), days	781 (218-1584)	729.5 (218-1488.5)	0.28 ^b
Proportion of time in care on HAART, median (IQR), %	56.5 (0-95.9)	71.4 (0-98.2)	0.01 ^b

^aIQR: interquartile range.
^bWilcoxon rank-sum (Mann-Whitney) test.
^c2-sided Fisher's exact test.
^dAmong patients who received HAART (n=1825).

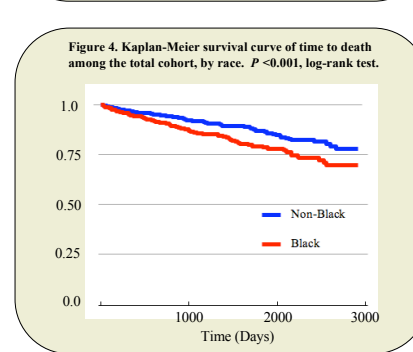
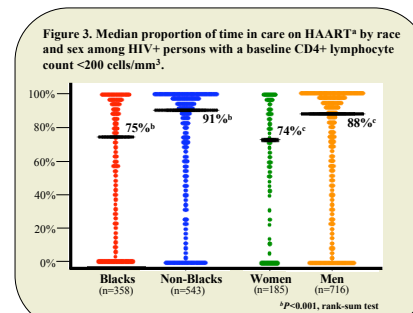
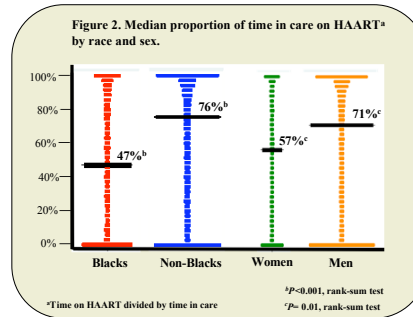


Table 3A. Cox proportional hazards model of factors at enrollment associated with death^a

Variable	Univariate HR (P)	HR (95% CI)	P Value
Black race	1.61 (<0.001)	1.34 (1.02-1.75)	0.035
Female sex	1.11 (0.47)	1.54 (1.13-2.09)	0.006
IVDU as HIV risk factor	1.73 (0.001)	1.65 (1.19-2.29)	0.003
AIDS diagnosis prior to first visit	2.57 (<0.001)	1.46 (1.05-2.03)	0.02
Age at first visit, years	1.04 (<0.001)	1.03 (1.02-1.05)	<0.001
Baseline CD4+ lymphocyte count	0.997 (<0.001)	0.998 (0.997-0.999)	<0.001

Table 3B. Cox proportional hazards model of factors, including HAART utilization, associated with death^a

Variable	HR (95% CI)	P Value
>65% of time in care on HAART ^b	0.20 (0.15-0.27)	<0.001
Black race	1.04 (0.78-1.37)	0.81
Female sex	1.52 (1.12-2.07)	0.007
IVDU as HIV risk factor	1.36 (0.98-1.89)	0.07
AIDS diagnosis prior to first visit	1.82 (1.30-2.54)	<0.001
Age at first visit, years	1.04 (1.03-1.06)	<0.001
Baseline CD4+ lymphocyte count, cells/mm ³	0.997 (0.997-0.998)	<0.001

^aIn addition to the variables listed in Tables 3A and 3B, the following variables were included in both multivariate models: ART/HAART exposure prior to first visit, baseline CD4+ percent, and baseline HIV-1 RNA level. ART exposure prior to initiation of HAART was also included in the second Cox hazards model. These variables were not significantly associated with death in either model. ^bUnivariate HR 0.45 (P<0.001)

Limitations

- Our data were retrospective and from a single US outpatient clinic.
- We were unable to analyze causes of death. We also did not assess for active substance abuse, Hepatitis C, or include an assessment of HAART adherence.
- We did not have information on why blacks or females were less likely to be on HAART (i.e. patient vs. provider preference).

Conclusions

- Among HIV+ persons in care between 1998 and 2005, we found significant race and sex disparities in HAART utilization and survival.
- When the data were adjusted for characteristics at first clinic visit, death was associated with black race, female sex and IVDU as HIV risk factor.
- We found that women and blacks were less likely to be on HAART than men and non-blacks, respectively. These relationships held when limited to persons with baseline CD4<200.
- When we adjusted for HAART utilization, black race and IVDU were no longer associated with death, but female sex remained associated.
- Addressing survival disparities will require increased HAART utilization in blacks; the increased risk of death in women requires further study.

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