hiv/aids

1st HALF `11 EPIDEMIOLOGY REPORT

WASHINGTON STATE • SEATTLE & KING COUNTY

Washington State/Seattle-King County HIV/AIDS Epidemiology Report

Credits

This 78th edition of the HIV/AIDS Epidemiology Report includes data available through the end of June 2011. This report is produced jointly by Public Health – Seattle & King County and the Infectious Disease Assessment Unit, Washington State Department of Health. It is funded partly by a Centers for Disease Control and Prevention cooperative agreement for HIV/AIDS surveillance. We thank the medical providers caring for people with HIV/AIDS and the clinics and patients participating in epidemiologic projects. Their cooperation with public health department HIV/AIDS control efforts permits the collection of data included in this report which are used for further prevention and planning efforts. We also wish to acknowledge the outstanding assistance of our staff, including Faythe Crosby and Christy Johnson (disease investigation), Sandy Hitchcock (data entry and quality assurance), Shirley Zhang and Leslie Pringle (data management), and Amy Bennett and Christina Thibault (epidemiologists).

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HIV/AIDS Reporting Requirements

Detailed requirements for reporting of communicable disease including HIV/AIDS are described in the Washington Administrative Code (WAC), section 246-101 (http://apps.leg.wa.gov/WAC/default.aspx?cite=246-101).

Washington health care providers are required to report all HIV infections, regardless of the date of the patient's initial diagnosis, to the health department. Providers are also required to report new diagnoses of AIDS in a person previously diagnosed with HIV infection. Local health department officials forward case reports to the Department of Health. Names are never sent to the federal government.

Laboratories are required to report evidence of HIV infection (i.e., positive western blot assays, p24 antigen detection, viral culture, and nucleic acid detection), all HIV viral load tests (detectable or not), and all CD4 counts in the setting of HIV infection. If the laboratory cannot distinguish tests, such as CD4 counts, done due to HIV versus other diseases (such as cancer), the CD4 counts should be reported and the health department will investigate. However, laboratory reporting does not relieve health care providers of their duty to report, as most of the critical information necessary for surveillance and follow-up is not available to laboratories.

For further information about HIV/AIDS reporting requirements, please call your local health department or the Washington State Department of Health at 888-367-5555. In King County, call 206-296-4645.

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HIV/AIDS Epidemiology publications are online at:
www.kingcounty.gov/healthservices/health/communicable/hiv/epi.aspx.

Alternative formats provided upon request.
To be included on the mailing list or for address corrections,
please call 206-296-4645.

HIV/AIDS Epidemiology and Surveillance News

Executive Summary

Report Summary: The first section of this report is comprised of nine pages of tables and figures that summarize HIV reports through June 30, 2011. Highlights include:

- 6,814 documented people living with HIV or AIDS (PLWHA) were residents of King County (which has an estimated total 7,200–8,000 PLWHA, see Table 1).
- 10,997 documented PLWHA were residents of Washington State (which has an estimated 11,500–12,700 PLWHA, Table 1).
- The most highly-impacted areas in Washington are King County, with 62% of PLWHA, Pierce County, with 9% of PLWHA, and Snohomish County, with 6% of PLWHA (Table 2).
- In King County, males comprise 90% of PLWHA (Table 4), most of them men who have sex with men (MSM 87%, including MSM who injected drugs, or IDU).
- In Washington State, PLWHA were 86% male and of these, 82% were MSM including MSM-IDU (Table 6).
- The most common decade of life for diagnosis of HIV was 30-39 for men and 20-29 for women (Table 6).
- Between 2008 and 2010, 23% of people with new HIV diagnoses in Washington were foreign-born (Table 9). In King County in the same period, 26% were foreign-born (Table 8).
- Between 2002 and 2010, the percent of people newly-diagnosed with HIV who were MSM increased, and the percent of IDU decreased (Tables 8 and 9).

Annual Review of HIV/AIDS in King County: This article starts with a very brief summary of HIV globally and nationally to help put local data into perspective. Locally we have seen increases in the proportion of new HIV diagnoses among MSM – this is consistent with a local syphilis upswing. HIV diagnoses have increased among younger (less than 30 years) and older (50-59 year olds) individuals relative to the modal decade of 30-39 years where most HIV diagnoses still occur. Although still centered in urban areas (for us, Seattle), HIV has been increasingly diagnosed among non-Seattle-King County residents. HIV incidence surveillance indicates that new diagnoses of HIV are consistent with recent infections (within 12 months) for about one in three people. About one in eight newly- diagnosed individuals was infected with a strain of HIV resistant to one or more class of antiretroviral drugs. Among PLWH with recent laboratory assessments, about two-thirds had undetectable viral load and close to half (52%) had CD4+ lymphocyte counts of 500 cells/μL and higher.

Antiretroviral Resistance Surveillance: In this article, we provide the "fine print" of how antiretroviral drug resistance surveillance got started in King County and two other regions (Colorado and Illinois). HIV testing facilities (primarily publicly funded) within these sites collected serum samples. Results are presented from genotyping remnant diagnostic specimens of treatment-naïve individuals newly-diagnosed with HIV from 2003-2007. The 2,183 individuals included in ARVDRT were more likely to be younger, White, and MSM relative to other newly-diagnosed HIV cases. The amplification success rate among individuals with sufficient sample volume to be sent to a lab for genotyping was 90%. Factors associated with non-amplification included low sample volume, low viral load, and greater than five days between collection and freezing of sample. The ARVDRT project demonstrated that drug resistance surveillance using remnant diagnostic samples is possible. Including more representative testing sites, increasing the volume of serum samples collected, adjusting storage protocols, and utilizing laboratory advances to amplify lower levels of virus in samples could improve the success of drug resistance surveillance.

Deaths Among HIV-infected People: A three-pronged project is presented here to better quantify and describe factors associated with deaths among HIV-infected people. The authors conducted health care provider interviews and supplementary chart reviews for 2009 deaths and also looked at surveillance data comparing decedents with PLWHA 2008–2010. Findings included that about one-third of 2009 deaths may have been due to opportunistic illness; other major causes included neoplasms, liver disease, pulmonary disease, heart disease, and self-harm. Deaths were more likely to occur among older individuals, IDU, and people with late diagnoses of HIV (within one year of an AIDS diagnosis).

National HIV Behavioral Survey (NHBS) Among Heterosexuals — 2010: NHBS surveys MSM, IDU, and heterosexuals over a three year cycle (one risk group each year). The 2010 data describe the second heterosexual cycle with 453 eligible participants (after excluding MSM and IDU) recruited from a respondent-driven-sampling (or snowball) technique. The project was successful in recruiting participants with lower incomes and education relative to King County in its

entirety. High risk (unprotected) sexual encounters were more commonly reported by women, older individuals, those with multiple casual partners, and individuals reporting illicit drug use and binging on alcohol. Participants whose last sexual encounter was with a casual partner (as opposed to a main partner) and those whose last sexual counter was unprotected were less likely to have tested for HIV in the past 12 months relative to others.

Gay Pride 2011 Survey: In this highly timely report, results from the 2011 survey of 346 MSM at the Seattle Gay Pride event are summarized and compared to similar surveys in 2009 and 2010. Most participants were White, were 40 years of age and under, had at least some college, and had health insurance. Eight to 12% had unprotected intercourse with serodiscordant or unknown HIV status partners; this is down from 10 to 17% in previous years. Nine percent report never having tested for HIV and an additional 15% had not tested in the past 24 months.

Medical Monitoring Project (MMP) 2009 Summary: Washington State has participated in MMP since 2005. In this article, interview and limited medical record review data from 2009 are summarized. Key findings include that 180 interviews and 252 medical record reviews were done for the 400 sampled PLWHA. Most (90%) were receiving antiretroviral therapy. Medical record review data confirmed that most of these (77%) were virologically-suppressed. There was a correlation between individuals reporting three or more auxiliary service gaps (such as dental care, childcare, or housing) and not achieving viral suppression. However, a relatively low participation rate impedes our use of these data.

Vitamin D, Brittle Bones, and HIV: In this article, the importance of vitamin D and its impact on health are described. Because both HIV and its treatment are associated with decreased bone density, the AIDS Clinical Trials Group is researching whether vitamin D and calcium supplementation can reduce this bone loss.

HIV Reporting: If you are a medical provider making HIV or AIDS diagnoses, please note that reporting requirements for HIV are summarized on page ii. Although HIV case reporting may be initiated by laboratory reporting and completed by health department staff, we greatly appreciate medical providers submitting case reports directly – especially for persons newly-diagnosed with HIV or AIDS. Case report forms are available online or by calling 888-367-555 (State) or 206-296-4645 (King County). To ensure correct and timely data, provider reporting of patient deaths are also appreciated.

We hope you find this 78th edition of the Washington State – King County HIV/AIDS Epidemiology Report useful and informative.

Snapshot of HIV and AIDS Numbers in King County and Washington

	King County	Washington
Estimated[a] number living with HIV/AIDS	7,200 to 8,000	11,500 to 12,700
Estimated new HIV infections 2010	320 to 340	500 to 600
Estimated 2010 deaths among people with HIV or AIDS	75	130
Proportion with HIV who know their HIV status	80% to 90%	80% to 90%
Reported[a] number of people living with HIV/AIDS	6,814	10,997

Table 1: Surveillance of reported[a] HIV/AIDS cases, deaths, and people living with HIV/AIDS - King County, other Washington counties, Washington, and the United States (reported as of 6/30/2011)

		Adult/Adolescent HIV	Adult/Adolescent AIDS	Total
King County	New cases reported in 1st half 2011	106	30	136
	Cases reported year-to-date	106	30	136
	Cumulative cases	3,195	8,286	11,481
	Cumulative deaths	179	4,488	4,667
	Persons living (prevalent cases)	3,016	3,798	**6,814**
Other counties in Washington	New cases reported in 1st half 2011	71	36	107
	Cases reported year-to-date	71	36	107
	Cumulative cases	1,891	4,900	6,791
	Cumulative deaths	150	2,458	2,608
	Persons living (prevalent cases)	1,741	2,442	**4,183**
Washington	New cases reported in 1st half 2011	177	66	243
	Cases reported year-to-date	177	66	243
	Cumulative cases	5,086	13,186	18,272
	Cumulative deaths	329	6,946	7,275
	Persons living (prevalent cases)	4,757	6,240	**10,997**
United States[b]	Estimated cases as of 12/31/2009			
	Cumulative cases	Unknown	1,113,971	Unknown
	Cumulative deaths	Unknown	617,025	Unknown
	Persons living (prevalent cases)	356,036	496,946	**852,982**

a. The difference between the estimated number (line 1) and the reported number (line 5) above include:
   i. A small number of persons diagnosed with AIDS but not yet reported (perhaps 5% of total AIDS reports).
   ii. An unknown number of persons diagnosed with HIV infection but not yet reported.
   iii. An unknown number of persons (10-20% of the total) infected with HIV but not yet diagnosed or reported.

b. U.S. data reporting includes HIV and AIDS data from 50 states plus 5 U.S. dependent areas.

Table 2: Cumulative HIV/AIDS case counts and deaths by resident county and AIDSNet region at diagnosis, Washington (reported as of 6/30/2011)

		Cumulative Cases	Deaths		Presumed Living			
			N	%[a]	HIV	AIDS	Total	Total %[b]
	Adams	7	1	14%	1	5	6	0.1%
	Asotin	25	8	32%	6	11	17	0.2%
	Columbia	7	3	43%	0	4	4	0.0%
	Ferry	7	6	86%	0	1	1	0.0%
	Garfield	1	0	0%	1	0	1	0.0%
	Lincoln	4	2	50%	0	2	2	0.0%
	Okanogan	38	11	29%	8	19	27	0.2%
	Pend Orielle	11	6	55%	1	4	5	0.0%
	Spokane	761	328	43%	172	261	433	3.9%
	Stevens	27	15	56%	7	5	12	0.1%
	Walla Walla	64	33	52%	7	24	31	0.3%
	Whitman	21	4	19%	4	13	17	0.2%
Region 1	**Subtotal**	**973**	**417**	**43%**	**207**	**349**	**556**	**5.1%**
	Benton	142	42	30%	35	65	100	0.9%
	Chelan	74	26	35%	25	23	48	0.4%
	Douglas	8	2	25%	3	3	6	0.1%
	Franklin	87	21	24%	27	39	66	0.6%
	Grant	57	22	39%	14	21	35	0.3%
	Kittitas	23	10	43%	3	10	13	0.1%
	Klickitat	16	7	44%	6	3	9	0.1%
	Yakima	278	100	36%	65	113	178	1.6%
Region 2	**Subtotal**	**685**	**230**	**34%**	**178**	**277**	**455**	**4.1%**
	Island	92	40	43%	22	30	52	0.5%
	San Juan	28	12	43%	6	10	16	0.1%
	Skagit	101	43	43%	20	38	58	0.5%
	Snohomish	1,084	388	36%	275	421	696	6.3%
	Whatcom	242	98	40%	62	82	144	1.3%
Region 3	**Subtotal**	**1,547**	**581**	**38%**	**385**	**581**	**966**	**8.8%**
Region 4	**King**	**11,481**	**4,667**	**41%**	**3016**	**3,798**	**6,814**	**62.0%**
	Kitsap	325	131	40%	77	117	194	1.8%
	Pierce	1,670	671	40%	468	531	999	9.1%
Region 5	**Subtotal**	**1,995**	**802**	**40%**	**545**	**648**	**1,193**	**10.8%**
	Clallam	85	40	47%	19	26	45	0.4%
	Clark	702	246	35%	201	255	456	4.1%
	Cowlitz	155	61	39%	44	50	94	0.9%
	Grays Harbor	90	36	40%	20	34	54	0.5%
	Jefferson	40	18	45%	9	13	22	0.2%
	Lewis	58	28	48%	9	21	30	0.3%
	Mason	128	32	25%	38	58	96	0.9%
	Pacific	33	13	39%	11	9	20	0.2%
	Skamania	8	6	75%	1	1	2	0.0%
	Thurston	289	98	34%	73	118	191	1.7%
	Wahkiakum	3	0	0%	1	2	3	0.0%
Region 6	**Subtotal**	**1,591**	**578**	**36%**	**426**	**587**	**1,013**	**9.2%**
Total		**18,272**	**7,275**	**40%**	**4,757**	**6,240**	**10,997**	**100%**

[a] Percent of county cases who have died (row %).
[b] Percent of total presumed living cases in Washington (column %).

Table 3: Demographic characteristics of people presumed living with HIV/AIDS – King County, other Washington counties, Washington, and the United States (reported as of 6/30/2011)

	King County		Other Counties		Washington		Estimated U.S.[a]	
	N	%	N	%	N	%	N	%
Sex								
Male	6,106	90%	3,361	80%	9,467	86%	492,174	72%
Female	708	10%	822	20%	1,530	14%	180,206	26%
Age Group at Diagnosis of HIV								
Under 13 years	34	0%	52	1%	86	1%	10,284	1%
13-19 years	127	2%	108	3%	235	2%	*Not Known*	
20-29 years	1,945	29%	1,233	29%	3,178	29%	*Not Known*	
30-39 years	2,835	42%	1,471	35%	4,306	39%	*Not Known*	
40-49 years	1,418	21%	919	22%	2,337	21%	*Not Known*	
50-59 years	383	6%	306	7%	689	6%	*Not Known*	
60 years and over	72	1%	94	2%	166	2%	*Not Known*	
Current Age as of 12/31/2010								
Under 13 years	10	0%	20	0%	30	0%	3,079	0%
13-19 years	28	0%	24	1%	52	0%	8,103	1%
20-29 years	455	7%	364	9%	819	7%	62,280	9%
30-39 years	1,252	18%	820	20%	2,072	19%	142,949	21%
40-49 years	2,687	39%	1,504	36%	4,191	38%	257,310	38%
50-59 years	1,802	26%	1,044	25%	2,846	26%	156,769	23%
60 years and over	580	9%	407	10%	987	9%	52,178	8%
Race/Ethnicity[b]								
White	4,576	67%	2,873	69%	7,449	68%	215,806	32%
Black	1,136	17%	524	13%	1,660	15%	315,838	46%
Hispanic	704	10%	516	12%	1,220	11%	134,241	20%
Asian & Pacific Islander	232	3%	136	3%	368	3%	4,290	1%
Asian	*216*	*3%*	*113*	*3%*	*329*	*3%*	*305*	*0%*
Native Hawaiian & Other PI	*16*	*0%*	*23*	*1%*	*39*	*0%*	*2,387*	*0%*
Native American or Alaskan Native	75	1%	88	2%	163	2%	8,981	1%
Multiple Race	90	1%	32	1%	122	1%	820	0%
Unknown Race	1	0%	14	0%	15	0%	0	0%
HIV Exposure Category								
Male-male sex	4,711	69%	2,091	50%	6,802	62%	310,498	45%
Injection drug use (IDU)	330	5%	486	12%	816	7%	130,390	19%
IDU & male-male sex	572	8%	351	8%	923	8%	35,472	5%
Heterosexual contact[c]	678	10%	756	18%	1,434	13%	191,634	28%
Blood product exposure[d]	29	0%	34	1%	63	1%	N/A[a]	
Perinatal exposure	27	0%	45	1%	72	1%	9,038	1%
Other/Undetermined[d]	467	7%	420	10%	887	8%	5,636	1%
Total	**6,814**	**100%**	**4,183**	**100%**	**10,997**	**100%**	**682,668**	**100%**

[a] U.S. persons living with HIV/AIDS were estimated for 12/31/2008 from data reported through 12/31/2009 and include AIDS cases for 50 states and 5 dependent areas, and HIV cases for 37 states and 5 dependent areas with confidential name-based HIV infection reporting as of 2005. Detailed data were not available for the remaining states.

i. U.S. data for age at diagnosis were not available. The current age data were calculated as of 12/31/2008.

ii. In the U.S. data for HIV Exposure Category, most cases with unknown exposure are redistributed to other categories. 'Other/ Undetermined' includes blood product exposure cases, and a small number of undistributed cases with risk not reported.

[b] All race and ethnicity categories are mutually exclusive; Asian, Native Hawaiian, and Pacific Islanders were grouped due to small cell sizes.

[c] King County and Washington data include presumed heterosexual cases (females who deny injection drug use but have had sexual intercourse with a man whose HIV status or HIV risk behaviors are unknown).

[d] Undetermined mode of exposure includes cases with incomplete information, and heterosexual contact where the heterosexual partner(s) are not known to be HIV-infected, IDU, or bisexual male. One King County/WA case was probably infected via occupational exposure.

Table 4: People presumed living with HIV/AIDS by gender, race or ethnicity, and HIV exposure category – King County (reported as of 6/30/2011)

HIV Exposure Category	White[a] N	White[a] %	Black[a] N	Black[a] %	Hispanic N	Hispanic %	Asian & PI[a,b] N	Asian & PI[a,b] %	Native Am/AN[a,c] N	Native Am/AN[a,c] %	Total[d] N	Total[d] %
Male												
Male-male sex	3,602	79%	393	35%	474	67%	154	66%	30	40%	4,711	69%
Injection drug use (IDU)	109	2%	60	5%	33	5%	5	2%	6	8%	216	3%
IDU & male-male sex	450	10%	41	4%	47	7%	5	2%	14	19%	572	8%
Heterosexual contact	46	1%	109	10%	25	4%	7	3%	0	0%	188	3%
Blood product exposure	14	0%	3	0%	0	0%	0	0%	0	0%	17	0%
Perinatal exposure	1	0%	6	1%	0	0%	1	0%	0	0%	9	0%
Undetermined/other	112	2%	170	15%	73	10%	33	14%	2	3%	393	6%
Male Subtotal	**4,334**	**95%**	**782**	**69%**	**652**	**93%**	**205**	**88%**	**52**	**69%**	**6,106**	**90%**
Female												
Injection drug use (IDU)	65	1%	33	3%	3	0%	0	0%	10	13%	114	2%
Heterosexual contact[e]	153	3%	258	23%	39	6%	22	10%	12	16%	490	7%
Blood product exposure	4	0%	8	1%	0	0%	0	0%	0	0%	12	0%
Perinatal exposure	3	0%	12	1%	2	0%	1	0%	0	0%	18	0%
Undetermined/other	17	0%	43	4%	8	1%	4	2%	1	1%	74	1%
Female Subtotal	**242**	**5%**	**354**	**31%**	**52**	**7%**	**27**	**12%**	**23**	**31%**	**708**	**10%**
Total	**4,576**	**100%**	**1,136**	**100%**	**704**	**100%**	**232**	**100%**	**75**	**100%**	**6,814**	**100%**

Table 5: People presumed living with HIV/AIDS by gender, race or ethnicity, and HIV exposure category – Washington (reported as of 6/30/2011)

HIV Exposure Category	White[a] N	White[a] %	Black[a] N	Black[a] %	Hispanic N	Hispanic %	Asian & PI[a,b] N	Asian & PI[a,b] %	Native Am/AN[a,c] N	Native Am/AN[a,c] %	Total[d] N	Total[d] %
Male												
Male-male sex	5,212	70%	548	33%	691	57%	210	57%	58	36%	6,802	62%
Injection drug use (IDU)	337	5%	100	6%	68	5%	7	2%	14	9%	530	5%
IDU & male-male sex	730	10%	65	4%	77	6%	8	2%	21	13%	923	8%
Heterosexual contact	137	2%	167	10%	67	5%	15	4%	7	4%	396	4%
Blood product exposure	39	1%	3	0%	2	0%	0	0%	0	0%	44	0%
Perinatal exposure	7	0%	18	1%	2	0%	2	1%	1	1%	32	0%
Undetermined/other	296	4%	225	14%	157	13%	51	14%	6	4%	740	7%
Male Subtotal	**6,758**	**91%**	**1,126**	**68%**	**1,064**	**87%**	**293**	**80%**	**107**	**66%**	**9,467**	**86%**
Female												
Injection drug use (IDU)	184	2%	59	4%	16	1%	4	1%	20	12%	286	3%
Heterosexual contact[e]	439	6%	376	23%	119	10%	56	15%	34	21%	1,038	9%
Blood product exposure	6	0%	9	1%	1	0%	3	1%	0	0%	19	0%
Perinatal exposure	10	0%	22	1%	5	0%	3	1%	0	0%	40	0%
Undetermined/other	52	1%	68	4%	15	1%	9	2%	2	1%	147	1%
Female Subtotal	**691**	**9%**	**534**	**32%**	**156**	**13%**	**75**	**20%**	**56**	**34%**	**1,530**	**14%**
Total	**7,449**	**100%**	**1,660**	**100%**	**1,220**	**100%**	**368**	**100%**	**163**	**100%**	**10,997**	**100%**

[a] And not Hispanic. All race and ethnicity categories are mutually exclusive.
[b] Due to small cell sizes, data have been combined for Asians, Native Hawaiians, and other Pacific Islanders.
[c] Native American or Alaska Native.
[d] Totals include 87 King County and 119 Washington persons classified as multiple race, and 1 King County and 15 Washington persons with missing race.
[e] Includes presumed heterosexual cases (females who deny injection drug use but have had sexual intercourse with a man whose HIV status and HIV risk behaviors are unknown).

Table 6: People presumed living with HIV/AIDS by gender and age at HIV diagnosis – King County and Washington (reported as of 6/30/2011)

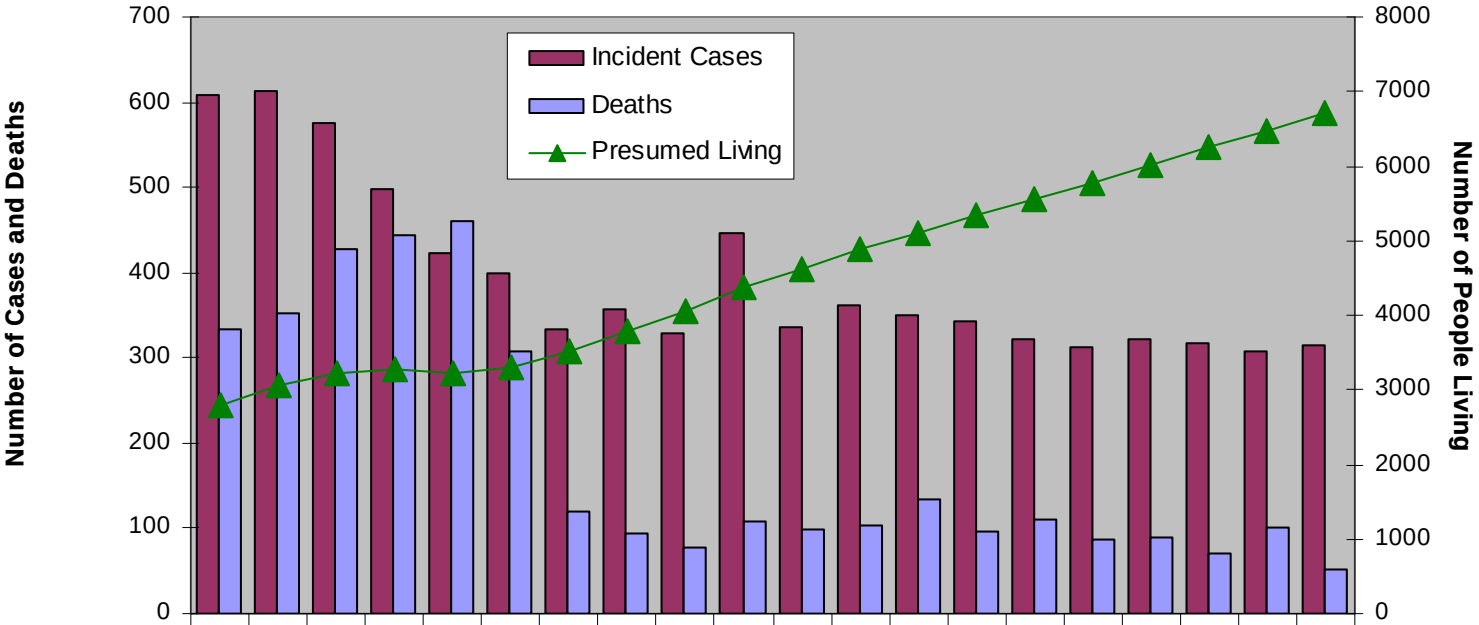
	King County				Washington			
Age at HIV Diagnosis	**Male**		**Female**		**Male**		**Female**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Under 13 years	15	0%	19	3%	40	0%	46	3%
13-19 years	88	1%	39	6%	154	2%	81	5%
20-24 years	618	10%	94	13%	1,027	11%	227	15%
25-29 years	1,094	18%	139	20%	1,645	17%	279	18%
30-34 years	1,381	23%	131	19%	2,027	21%	261	17%
35-39 years	1,224	20%	99	14%	1,795	19%	223	15%
40-44 years	825	14%	70	10%	1,281	14%	173	11%
45-49 years	478	8%	45	6%	785	8%	98	6%
50-54 years	213	3%	40	6%	377	4%	72	5%
55-59 years	108	2%	22	3%	193	2%	47	3%
60 years and over	62	1%	10	1%	143	2%	23	2%
Total	**6,106**	**100%**	**708**	**100%**	**9,467**	**100%**	**1,530**	**100%**

Table 7: People presumed living with HIV/AIDS by race or ethnicity and place of birth[a] – King County and Washington (reported as of 6/30/2011)

	King County				Washington			
Race / Ethnicity	**U.S.-born**		**Foreign-born**		**U.S.-born**		**Foreign-born**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
White, non-Hispanic	4,254	97%	129	3%	6,944	98%	171	2%
Black, non-Hispanic	681	16%	426	10%	1,054	15%	556	8%
Male Black, non-Hispanic	*541*		*220*		*814*		*275*	
Female Black, non-Hispanic	*140*		*206*		*240*		*281*	
Hispanic	266	6%	378	9%	428	6%	667	9%
Asian & PI, non-Hispanic	65	2%	148	3%	103	1%	232	3%
Native American, non-Hispanic	68	2%	5	0%	154	2%	5	0%
Multiple or unknown race, non-Hispanic	76	2%	9	0%	114	2%	13	0%
TOTAL	**5,410**	**83%**	**1,095**	**17%**	**8,797**	**84%**	**1,644**	**16%**

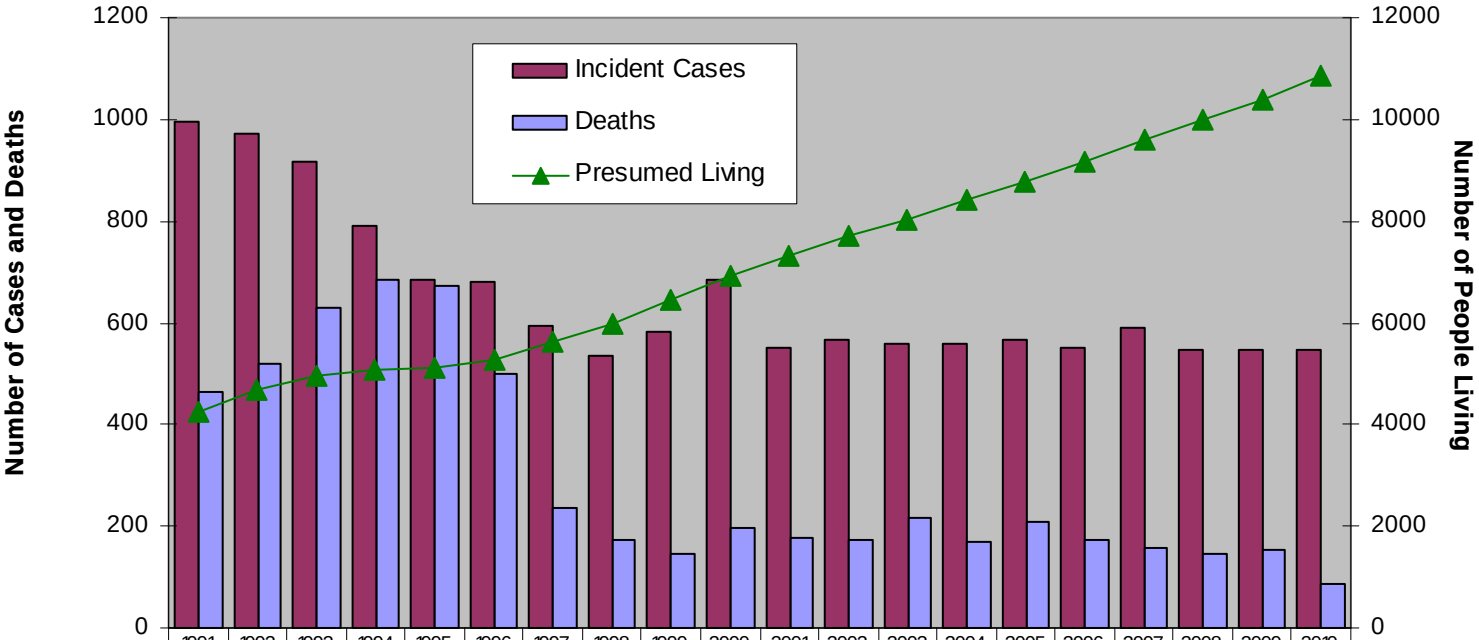
[a] Table 7 does not include 309 King County and 556 Washington cases missing place of birth information.

Figure 1: Number of new HIV/AIDS diagnoses, deaths, and people living with HIV/AIDS – King County (reported as of 6/30/2011)



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Incident Cases	608	614	575	497	423	399	334	356	330	447	335	362	350	343	322	313	321	317	308	314
Deaths	333	353	427	445	461	308	120	94	78	107	99	104	135	96	111	86	89	71	102	52
Presumed Living	2801	3062	3210	3262	3224	3315	3529	3791	4043	4383	4619	4877	5092	5339	5550	5777	6009	6255	6461	6723

Figure 2: Number of new HIV/AIDS diagnoses, deaths, and people living with HIV/AIDS – Washington (reported as of 6/30/2011)



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Incident Cases	994	971	915	792	685	679	595	534	582	686	552	566	558	559	567	550	590	545	548	547
Deaths	465	521	629	683	673	499	236	173	144	196	177	174	216	171	210	172	158	146	155	88
Presumed Living	4241	4691	4977	5086	5098	5278	5637	5998	6436	6926	7301	7693	8035	8423	8780	9158	9590	9989	10382	10841

Table 8: Demographic characteristics of King County residents diagnosed 1982-2010, by date of HIV diagnosis (reported through 6/30/2011)

	1982-2001		2002-2004		2005-2007		2008-2010[a]		Trend[b]
	N	%	N	%	N	%	N	%	2002-2010
TOTAL	**8,423**	**100%**	**1,055**	**100%**	**956**	**100%**	**939**	**100%**	
HIV Exposure Category									
Men who have sex with men (MSM)	6,218	76%	679	70%	587	71%	619	76%	up
Injection drug user (IDU)	483	6%	67	7%	40	5%	34	4%	down
MSM-IDU	861	11%	87	9%	89	11%	54	7%	
Heterosexual contact[c]	473	6%	142	15%	106	13%	100	12%	
Blood product exposure	96	1%	1	0%	1	0%	1	0%	
Perinatal exposure	27	0%	0	0%	1	0%	6	1%	
SUBTOTAL- known risk	*8,158*	*100%*	*976*	*100%*	*824*	*100%*	*814*	*100%*	
Undetermined/other[d]	265	3%	79	7%	132	14%	125	13%	N/A
Sex & Race/Ethnicity[e]									
Male	*7,856*	*93%*	*935*	*89%*	*842*	*88%*	*819*	*87%*	
White male	6,245	74%	597	57%	519	54%	514	55%	
Black male	784	9%	160	15%	133	14%	101	11%	down
Hispanic male	527	6%	110	10%	119	12%	127	14%	up
Other male	300	4%	68	6%	71	7%	77	8%	up
Female	*567*	*7%*	*120*	*11%*	*114*	*12%*	*120*	*13%*	
White female	261	3%	31	3%	31	3%	36	4%	
Black female	210	2%	68	6%	63	7%	65	7%	
Hispanic female	40	0%	8	1%	6	1%	13	1%	
Other female	56	1%	13	1%	14	1%	6	1%	
Race/Ethnicity[e]									
White	6,506	77%	628	60%	550	58%	550	59%	
Black	994	12%	228	22%	196	21%	166	18%	down
Hispanic	567	7%	118	11%	125	13%	140	15%	up
Asian & Pacific Islander	152	2%	34	3%	56	6%	54	6%	up
Native American or Alaska Native	102	1%	19	2%	8	1%	5	1%	down
Multiple race	101	1%	28	3%	21	2%	24	3%	
SUBTOTAL- known race/ethnicity	*8,422*	*100%*	*1,055*	*100%*	*956*	*100%*	*939*	*100%*	
Unknown race	1	N/A	0	N/A	0	N/A	0	N/A	N/A
Place of Birth									
Born in U.S. or Territories	7,533	92%	818	79%	686	76%	667	74%	down
Born outside U.S.	671	8%	223	21%	214	24%	230	26%	up
SUBTOTAL- known birthplace	*8,204*	*100%*	*1,041*	*100%*	*900*	*100%*	*897*	*100%*	
Birthplace unknown	219	3%	14	1%	56	6%	42	4%	N/A
Age at Diagnosis of HIV									
0-19 years	145	2%	9	1%	11	1%	33	4%	up
20-29 years	2,199	26%	220	21%	242	25%	255	27%	up
30-39 years	3,785	45%	458	43%	349	37%	283	30%	down
40-49 years	1,729	21%	277	26%	245	26%	230	24%	
50-59 years	463	5%	76	7%	80	8%	114	12%	up
60+ years	102	1%	15	1%	29	3%	24	2%	
Residence									
Seattle residence	7,236	86%	801	76%	699	73%	659	70%	down
King County residence outside Seattle	1,187	14%	254	24%	257	27%	280	30%	up

[a] Due to delays in reporting, data from recent years are incomplete.
[b] Chi-square statistical trends in proportions ($p<.05$) were calculated for cases with known characteristics for the periods 2002-2004, 2005-2007, and 2008-2010.
[c] Includes presumed heterosexual cases (females who deny injection drug use but have had sexual intercourse with a man whose HIV status or HIV risk behaviors are unknown).
[d] Includes persons for whom exposure information is incomplete (due to death, refusal to be interviewed, or loss to follow up), persons exposed to HIV through their occupation, and patients who mode of exposure remains undetermined.
[e] All race and ethnicity categories are mutually exclusive; Asian, Native Hawaiian and Pacific Islanders were grouped due to small cell sizes.

Table 9: Demographic characteristics of Washington residents diagnosed 1982-2010, by date of HIV diagnosis (reported through 6/30/2011)

	1982-2001		2002-2004		2005-2007		2008-2010[a]		Trend[b]
	N	%	N	%	N	%	N	%	2002-2010
TOTAL	**13,068**	**100%**	**1,685**	**100%**	**1,707**	**100%**	**1,624**	**100%**	
HIV Exposure Category[d]									
Men who have sex with men (MSM)	8,710	70%	963	62%	955	65%	951	69%	up
Injection drug user (IDU)	1,184	9%	153	10%	118	8%	83	6%	down
MSM-IDU	1,320	11%	135	9%	144	10%	95	7%	
Heterosexual contact[c]	1,029	8%	284	18%	246	17%	230	17%	
Blood product exposure	216	2%	3	0%	3	0%	1	0%	
Perinatal exposure	60	0%	3	0%	4	0%	22	2%	
SUBTOTAL- known risk	*12,519*	*100%*	*1,541*	*100%*	*1,470*	*100%*	*1,382*	*100%*	
Undetermined/other[d]	547	4%	142	8%	237	14%	258	16%	N/A
Sex & Race/Ethnicity[e]									
Male	*11,803*	*90%*	*1,417*	*84%*	*1,446*	*85%*	*1,382*	*84%*	
White male	9,407	72%	948	56%	943	55%	834	51%	down
Black male	1,087	8%	212	13%	202	12%	177	11%	
Hispanic male	843	6%	162	10%	196	11%	243	15%	up
Other male	466	4%	95	6%	105	6%	128	8%	up
Female	*1,263*	*10%*	*266*	*16%*	*261*	*15%*	*258*	*16%*	
White female	694	5%	102	6%	107	6%	99	6%	
Black female	328	3%	109	6%	99	6%	99	6%	
Hispanic female	114	1%	23	1%	30	2%	36	2%	
Other female	127	1%	32	2%	25	1%	24	1%	
Race/Ethnicity[e]									
White	10,101	77%	1,050	62%	1,050	62%	933	57%	down
Black	1,415	11%	321	19%	301	18%	276	17%	
Hispanic	957	7%	185	11%	226	13%	279	17%	up
Asian & Pacific Islander	229	2%	56	3%	81	5%	84	5%	up
Native American or Alaska Native	191	1%	36	2%	20	1%	26	2%	
Multiple race	157	1%	35	2%	29	2%	42	3%	
SUBTOTAL- race/ethnicity	*13,050*	*100%*	*1,683*	*100%*	*1,707*	*100%*	*1,640*	*100%*	
Unknown race	16	N/A	0	N/A	0	N/A	0	N/A	

Table 9 continued on next page

[a] Due to delays in reporting, data from recent years are incomplete.
[b] Chi-square statistical trends in proportions ($p<.05$) were calculated for cases with known characteristics for the periods 2002-2004, 2005-2007, and 2008-2010.
[c] Includes presumed heterosexual cases (females who deny injection drug use but have sex with men not known to be HIV-infected).
[d] Includes persons for whom exposure information is incomplete (due to death, refusal to be interviewed, or loss to follow up), patients still under investigation, persons whose only risk was heterosexual contact and where the risk of the sexual partner(s) was (were) undetermined, persons exposed to HIV through their occupation, and patients who mode of exposure remains undetermined.
[e] All race and ethnicity categories are mutually exclusive; Asian, Native Hawaiian and Pacific Islanders were grouped due to small cell sizes.
[f] The counties and regions are: Region 1-Adams, Asotin, Columbia, Ferry, Garfield, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, and Whitman; Region 2-Benton, Chelan, Douglas, Franklin, Grant, Kittitas, Klickitat, and Yakima; Region 3-Island, San Juan, Skagit, Snohomish, and Whatcom; Region 4-King; Region 5-Kitsap and Pierce; Region 6-Clallum, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Skamania, Thurston, and Wahkiakum.

Table 9 (Continued): Demographic characteristics of Washington residents diagnosed 1982-2010, by date of HIV diagnosis (reported through 6/30/2011)

	1982-2001		2002-2004		2005-2007		2008-2010[a]		Trend[b]
	N	%	N	%	N	%	N	%	2002-2010
TOTAL	**13,066**	**100%**	**1,683**	**100%**	**1,707**	**100%**	**1,640**	**100%**	
Place of Birth									
Born in U.S. or Territories	11,719	90%	1,340	80%	1,263	74%	1,155	70%	down
Born outside U.S.	988	8%	310	18%	320	19%	370	23%	up
SUBTOTAL- known birthplace	*12,707*	*100%*	*1,650*	*100%*	*1,583*	*100%*	*1,525*	*100%*	
Birthplace unknown	359	3%	33	2%	124	7%	115	7%	N/A
Age at diagnosis of HIV									
0-19 years	287	2%	20	1%	41	2%	60	4%	up
20-29 years	3,509	27%	369	22%	420	25%	436	27%	up
30-39 years	5,639	43%	653	39%	550	32%	489	30%	down
40-49 years	2,661	20%	459	27%	460	27%	388	24%	down
50-59 years	751	6%	145	9%	183	11%	198	12%	up
60+ years	219	2%	37	2%	53	3%	69	4%	up
Residence[f]									
Region 1- Spokane area	684	5%	94	6%	100	6%	89	5%	
Region 2- Yakima area	426	3%	72	4%	85	5%	93	6%	
Region 3- Everett area	1,056	8%	139	8%	176	10%	158	10%	
Region 4- Seattle area	8,423	64%	1,055	63%	956	56%	939	58%	down
Region 5- Tacoma area	1,401	11%	166	10%	209	12%	199	12%	up
Region 6- Olympia area	1,076	8%	157	9%	181	11%	162	10%	

[a] Due to delays in reporting, data from recent years are incomplete.
[b] Chi-square statistical trends in proportions ($p<.05$) were calculated for cases with known characteristics for the periods 2002-2004, 2005-2007, and 2008-2010.
[c] Includes presumed heterosexual cases (females who deny injection drug use but have sex with men not known to be HIV-infected).
[d] Includes persons for whom exposure information is incomplete (due to death, refusal to be interviewed, or loss to follow up), patients still under investigation, persons whose only risk was heterosexual contact and where the risk of the sexual partner(s) was (were) undetermined, persons exposed to HIV through their occupation, and patients who mode of exposure remains undetermined.
[e] All race and ethnicity categories are mutually exclusive; Asian, Native Hawaiian and Pacific Islanders were grouped due to small cell sizes.
[f] The counties and regions are: Region 1-Adams, Asotin, Columbia, Ferry, Garfield, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, and Whitman; Region 2-Benton, Chelan, Douglas, Franklin, Grant, Kittitas, Klickitat, and Yakima; Region 3-Island, San Juan, Skagit, Snohomish, and Whatcom; Region 4-King; Region 5-Kitsap and Pierce; Region 6-Clallum, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Skamania, Thurston, and Wahkiakum.

Annual Review of the Epidemiology of HIV and AIDS in Seattle & King County

This article summarizes the status of the HIV and AIDS epidemics in King County, Washington through June 30, 2011, based upon reports of people with AIDS or HIV infection.

Global and National Perspective

According to the Joint United Nations Programme on HIV/AIDS, 33.3 million people worldwide were living with HIV or AIDS at the end of 2009, including 2 million children under 15 years of age.[1] On average, 0.8% of adults worldwide age 15-49 are infected with HIV. In 2009, an estimated 2.6 million persons acquired HIV infection, and 1.8 million deaths occurred. Twenty-eight million people have died from AIDS worldwide since AIDS was first identified in 1981.

At the end of 2008 there were an estimated 1.18 million HIV-infected people in the United States, including 20% who remain undiagnosed and unaware of their status.[2] CDC calculates approximately 48,100 new infections occurred in the U.S. in 2009[3], with over 16,600 deaths in 2008.[4]

In 2009, the Seattle Metropolitan Statistical Area including King, Snohomish and Pierce counties, ranked 54th nationally with an annual AIDS rate of 9.0 reported cases per 100,000 population. The highest metropolitan rates in the country were in Miami FL (37.2), Baton Rouge LA (30.6), Jacksonville FL (29.1), New York City (27.0), and Washington D.C. (26.6). [4]

Trends in Diagnosis of HIV Infection

The number of new HIV diagnoses in King County has dropped to about 325 per year (2005-2010) after being level at 350-400 new diagnoses 1997-2004. Because there are 100 or fewer HIV-related deaths annually, the reported number of King County residents living with HIV/AIDS is increasing (**Table 1**).

Based upon data reported through June 2011, we compared the characteristics of persons diagnosed with HIV infection during 2002-2004, 2005-2007, and 2008-2010. A chi-square test for trend was used to determine if there was a statistically significant change in proportion of cases for each group over those three periods (**Table 2**).

There have been only moderate shifts in the proportion of persons newly-diagnosed with HIV infection among different groups over the past nine years. Between the three-year periods 2002-2004 through 2008-2010 a statistically significant increase in the proportion of cases occurred among men who have sex with men (up from 70% to 76% of the total) while declining among injection drug users (7% to 4%). There were increases among Hispanics (from 11% to 15%), and Asians and Pacific Islanders (from 3% to 6%), and a decrease in the proportion of total cases among Blacks (from 22% to 18%).

There was a statistically significant decrease in the proportion of King County residents age 30-39 at diagnosis (from 43% to 30%), shifting toward increases among persons aged 0-19 (1% to 3%), 20-29 (21% to 27%), and 50-59 years (7% to 12%). At the same time, the population of people living with HIV has aged consistently over the past decade as HIV has become a chronic infection. In 1998, half of individuals living with HIV were age 0-39 and half were over age 40. In 2008, this median age was 46.

Although Seattle residents still compose the vast majority of HIV diagnoses, HIV diagnoses among other King County residents have increased. Comparing the percent of cases for 2002-2004 to 2008-2010, the proportion of cases among Seattle residents has dropped from 77% to 70% of newly-diagnosed cases, while South King County residents now make up 20% rather than 15% of new cases, and East/North King County residents continue to make up 9% of new cases.

The overall perinatal transmission rate in King County and in Washington is very low because of effective antiretroviral prophylaxis during pregnancy and at birth. Approximately 15-30 HIV-infected women give birth each year in Washington, and since 1997, one new perinatal infection was transmitted to an infant born in King County. This recent infection was from a mother not diagnosed with HIV infection at the time of delivery. Several additional recent perinatal infections were among children born elsewhere who moved to King County.

Table 1. Characteristics of King County residents with HIV or AIDS (reported as of 6/30/2011)

	Actual Reports		Diagnosed HIV Prevalence	
	Number Reported	Percent	2009[a] Population	Estimated Rate Per 100[b]
Total	**6,059**	**100%**	**1,909,297**	**0.3%**
Race/Ethnicity				
White, not Hispanic	4,004	66%	1,339,091	0.3%
Black, not Hispanic	1,043	17%	110,270	0.9%
Foreign-born Blacks	*405*	*7%*	*26,692*	*1.5%*
U.S.-born Blacks	*611*	*10%*	*83,558*	*0.7%*
Hispanic	627	10%	128,724	0.5%
Asian & Pacific Islander	225	4%	255,663	0.1%
Native American or Alaska Native	57	1%	15,385	0.4%
Multiple Race	99	2%	60,164	0.2%
Unknown Race	4	<1%	Not applicable	Not applicable
Sex & Race/Ethnicity				
Male	5,416	89%	951,292	0.6%
White Male	3,791	63%	664,096	0.6%
Black Male	711	12%	56,999	1.2%
Hispanic Male	583	10%	69,927	0.8%
Asian or Pacific Islander Male	201	3%	122,970	0.2%
Native American or Alaska Native Male	38	1%	7,702	0.5%
Multiple or Unknown Race	92	2%	29,598	0.3%
Female	643	11%	958,005	<0.1%
White Female	213	4%	674,995	<0.1%
Black Female	332	5%	53,271	0.6%
Hispanic Female	44	1%	58,797	0.1%
Asian or Pacific Islander Female	24	<1%	132,693	<0.1%
Native American or Alaska Native Female	19	<1%	7,683	0.2%
Multiple or Unknown Race	11	<1%	30,566	<0.1%
HIV Exposure Category				
Men who have sex w/men (MSM)	4,224	75%	39,000	10.8%
Injection drug user (IDU)	287	5%	15,000	1.9%
MSM-IDU	471	8%	3,150	15.0%
Blood product exposure	23	<1%	Unknown	Unknown
Heterosexual contact[c]	604	11%	1,300,000	<0.1%
Perinatal exposure	32	<1%	Unknown	Unknown
Subtotal- known exposure	5,641	100%	1,909,297	0.3%
Undetermined/ other	*418*	*7%*	*Not applicable*	*Not applicable*
Current Age as of 6/30/2009				
0-19 years	39	<1%	445,613	<0.1%
20-24 years	107	2%	139,036	<0.1%
25-34 years	766	13%	310,833	0.2%
35-44 years	1,669	28%	281,592	0.6%
45-54 years	2,302	38%	297,116	0.8%
55-64 years	990	16%	220,332	0.4%
65 years and over	186	3%	214,775	0.1%
Place of Birth				
U.S.-born	4,774	79%	1,546,310	0.3%
Foreign-born	1,012	17%	362,987	0.4%
Unknown birthplace	273	5%	Not applicable	Not applicable

[a] 2009 population estimates are from Washington Office of Financial Management website as of 8/22/2011, except estimates of foreign-born and foreign-born Blacks are from U.S. Census Bureau 2005-2009 American Community Survey.
[b] The HIV diagnosis rate is the total number of reported diagnoses divided by the population, and is presented as a percent. The true number infected including people who are not yet diagnosed, is estimated to be about 15% higher than this rate.
[c] Includes presumed heterosexual cases (women who do not inject drugs but have had sex with men of unknown HIV status).

Table 2. Trend characteristics of persons diagnosed with HIV infection in King County, 2002-2010

	2002-2010	
	Statistical Trend	**%**
HIV Exposure Category		
Men who have sex with men (MSM)	Increasing	70-76%
Injection drug user (IDU)	Decreasing	7-4%
MSM-IDU	No change	9%
Heterosexual contact	No change	13%
Sex & Race/Ethnicity		
Male	No change	88%
White Male	No change	55%
Black Male	Decreasing	15-11%
Hispanic Male	Increasing	10-14%
Female	No change	12%
White Female	No change	3%
Black Female	No change	7%
Hispanic Female	No change	1%
Race/Ethnicity		
White, non Hispanic	No change	59%
Black, non Hispanic	Decreasing	22-18%
Hispanic	Increasing	11-15%
Asian or Pacific Islander	Increasing	3-6%
American Indian/ Alaska Native	Decreasing	2-1%
Age at diagnosis of HIV		
0-19 years	Increasing	1-3%
20-29 years	Increasing	21-27%
30-39 years	Decreasing	43-30%
40-49 years	No change	25%
50-59 years	Increasing	7-12%
60+ years	No change	2%
Residence		
Seattle	Decreasing	77-70%
North and East King County	No change	9%
South King County	Increasing	15-20%
Place of birth, race, and exposure		
Born outside the U.S.	Increasing	21-26%
Foreign-born Blacks	*No change*	*9%*
Foreign-born who are not Black	*Increasing*	*11-16%*
Born in the U.S.	Decreasing	79-74%
Native-born Blacks	*No change*	*10%*
Native-born who are not Black	*Decreasing*	*66-62%*

Incidence and Resistance Testing

Public Health–Seattle & King County participates in two CDC projects that characterize infection in persons newly-diagnosed with HIV; to measure the number of new infections that are occurring each year, and to measure the prevalence of transmitted antiretroviral drug resistance among people newly-diagnosed with HIV. About two-thirds of newly-diagnosed cases are included in these projects. The data reveal several characteristics of the HIV virus circulating within the local population:

► Approximately one-third of new HIV diagnoses are among persons likely infected within the preceding 12 months.

► 12% of newly-diagnosed, treatment-naïve people have high-level resistance to one or more class of antiretroviral drugs; 2% are resistant to two or more classes of drugs. These proportions have not changed since local drug resistance surveillance began in 2003.

► 11% of people recently-diagnosed with HIV are infected with a non-B subtype of HIV-1. Most of these infections were among persons born in other countries.

Deaths Among People with HIV

As of June 30, 2011 more than 4,600 King County residents with HIV infection have died. The total number of deaths fluctuated between 70 and 140 annually from 1998 through 2009.

HIV/AIDS was the leading underlying cause of death among all 25-44 year old males in King County during the years 1989 to 1996, but dropped to the 5th leading cause of death by 2004.[5] The decline in deaths is due to implementing effective antiretroviral treatments, effective prophylaxis to prevent opportunistic infections, monitoring of HIV progression (for example by assays of CD4 counts and HIV viral load), and prevention efforts to reduce HIV transmission rates.

Some deaths are a direct result of HIV, including some people who learn their HIV status late in the course of disease, and some who experience treatment failures. Recently, however, an increasing proportion of deaths are unrelated to HIV infection, or only partially-related. **See the Epi Report article on deaths** in this issue for more information.

Number of People Living with HIV in King County

In 2009, the Washington State Department of Health estimated that 11,500 to 12,700 state residents, including 7,200 to 8,000 residents of King County are living with HIV or AIDS.[5, 6] **As shown in the HIV Statistics Tables 3-7 of this Epidemiology Report**, as of June 30, 2011, there were 6,814 reported cases of people who lived here when they were diagnosed and are not known to have died. Approximately another 500-1,200 have not been diagnosed and don't know their HIV status.

However, these numbers do not reflect substantial in-migration, out-migration, and an unknown number of deaths. We have recently clarified the residence on the majority of cases in our data, and obtained information on dozens of deaths that occurred outside of Washington. Therefore, as of June 30, 2011, there are 6,059 people assumed currently living with HIV infection in King County, and these cases are further described below.

Characteristics of People Living with HIV or AIDS

Table 1 presents the number of reported cases currently residing in King County (diagnosed HIV prevalence), and an HIV diagnosis rate based on 2009 (most current) population. The true HIV infection rates are about 15% higher when including people who have not yet been diagnosed. The HIV diagnosis rates vary widely between population groups but are highest among men who have sex with men (MSM–11%), injection drug users (IDU–2%), MSM who also inject drugs (MSM/IDU–15%), and foreign-born Blacks (1.5%). These four groups combined account for more than 89% of diagnosed infections in King County and are emphasized in HIV testing and prevention programs.

Eighty-nine percent of people living with HIV or AIDS in King County are male. Most, 66%, are White, 17% are Black, 10% Hispanic, 4% Asian/Pacific Islander (API), and 1% Native American & Alaska Natives (NA/AN). Seventy-nine percent were born in the U.S. or territories, 17% were foreign-born, and the birthplace was unknown for 4%. Compared with non-Hispanic Whites, the rates are five times higher among foreign-born Blacks, twice as high among U.S.-born Blacks, and 1.5 times higher among Hispanics.

Seven percent of cases do not have a reported behavioral exposure to HIV (using the standard CDC-defined categories). Among cases with known exposure, 75% are MSM, 8% are MSM-IDU, 5% are IDU, 11% report having a heterosexual partner with HIV or at risk of HIV infection, and fewer than 1% each were born to HIV-infected mothers or received blood products.

While the distribution of exposure categories differs by race, gender, and birth country, nearly all males are MSM, IDU, or foreign-born Blacks. Among White, Hispanic, and API men, MSM account for 75-84% of cases, and for 51-63% among Black or NA/AN men. MSM-IDU is the second most common exposure among White men (9%), Hispanic men (8%), and NA/AN men (24%). Foreign-born Blacks make up 28% of cases among Black men and are presumed to be mostly due to heterosexual transmission.

The vast majority of HIV-infected women are either IDU (16% of cases) or have a heterosexual partner who is IDU, bisexual, or is HIV-infected (68% of cases). Heterosexual exposures account for approximately two-thirds or more of female HIV cases regardless of race.

The place of birth for the 6,059 King County residents living with HIV was:

- 79% United States
- 6% Africa or Middle East
- 6% Mexico, Latin America and Caribbean
- 3% Asia, Australia, and Eastern Europe
- 1% Western Europe or Canada
- 5% Unknown birthplace

HIV diagnosis rates are higher among foreign-born Blacks (1.5%), than U.S.-born Blacks (0.7). King County has a number of special prevention interventions among foreign-born Blacks because the risk profiles, language, cultural, and educational needs differ from those among their U.S.-born counterparts. The majority of reported cases among foreign-born Blacks are due to heterosexual transmission (57%), or have no reported risk (32%), while 60% of U.S.-born Blacks are MSM or MSM-IDU, and 14% are IDU.

Sixty-six percent of King County residents living with HIV are currently age 35-54 years, and 19% are at least age 55 years of age. Another 13% are age 25-34, and just 2% are age 20-24. Seventy-seven percent of HIV-infected individuals reside in Seattle, 8% on the Eastside or north of Seattle and Lake Washington, and 15% in South King County.

Immunologic and Virologic Status

The Washington Administrative Code requires that laboratories report all CD4 results and all HIV viral load results, regardless of level, to Public Health. While these data may be incomplete, they allow us to evaluate the immunologic status of many King County residents living with HIV infection, and to compare against the National HIV Strategy goals. As of June 30, 2011, we documented that 89% (5,364) of residents with HIV have received a recent (2010-2011) CD4 or viral load laboratory result indicating they are accessing HIV medical care. Among the 695 without recent labs, 185 last had a lab reported to Public Health in 2009, 175 in 2005-2008, 170 in 2000-2004, 84 in 1989-1999, and 81 never had a lab reported. It is likely that many of those without labs since 2005 reflect outdated residence information.

Among the 5,364 King County residents with recent lab results, the most recent reported CD4 result showed 9% had severe immune deficiency (CD4 under 200 cells), 38% had moderate immune deficiency (15% with 200-349 CD4 cells and 23% with 350-499 CD4 cells per microliter), and 53% had negligible or no immune deficiency (CD4 500 or over). The most recent reported viral load test result showed that 80% had suppressed viral load (undetectable or under 200 copies per microliter), and 20% did not have suppressed viral load. These include 9% with a viral burden under 10,000 copies per microliter, 8% with a viral burden of 10,000-99,999 copies, and 3% with a viral burden over 100,000 copies.

Conclusions

King County has just over 6,000 residents diagnosed with HIV infection, including people who moved here after diagnosis in another state. Over 4,600 HIV-infected persons have died since 1982. The number of new HIV infections has declined recently, to about 325 each year since 2005, of which about one-quarter were not diagnosed with HIV until they had already developed AIDS. About 100 deaths occur each year.

The total number of people living with AIDS or with HIV infection in King County is increasing each year as new diagnoses exceed deaths among infected persons. Ninety percent of all infections are among MSM, IDU, or foreign-born Blacks. Most HIV-infected King County residents are White men who have sex with men, are 30-45 years of age at the time of diagnosis, and reside in Seattle. The proportion of cases is increasing among men who have sex with men, Hispanics, Asian & Pacific Islanders, people over age 50, and residents outside Seattle.

- *Contributed by Jim Kent*

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Successes and Challenges in Conducting Antiretroviral Resistance Surveillance

Background

Resistance to antiretrovirals (ARV) among treatment naïve HIV-infected individuals has been of increasing concern, with prevalence rates ranging from 10% to 25% in North America during the late 1990's through 2006[1-5]. Previous studies have shown that drug resistance can compromise the efficacy of highly active antiretroviral therapy (HAART) and may lead to adverse outcomes[6-9]. Population-level data on antiretroviral resistance can help guide HIV prevention and initial treatment decisions[3, 10], which may help reduce HIV transmissions, improve HAART efficacy[11] and increase survival[12]. Baseline drug resistance testing has been shown to be cost-effective when resistance rates are above 1%[13] and has been recommended by the U.S. Department of Health and Human Services for all HIV-infected patients entering into care[14].

Introduction

The Antiretroviral Drug Resistance Testing (ARVDRT) project was conducted to evaluate the feasibility and usefulness of genotypic resistance testing, which identifies mutation in the virus' genomes associated with drug resistance, as part of routine public health surveillance. Between 2003 and 2007, four Centers for Disease Control and Prevention (CDC)-sponsored sites used leftover diagnostic serum specimens to perform resistance tests. Sites were also encouraged to collect results from clinical genotyping tests. By 2008, HIV resistance testing became part of supplemental surveillance for HIV in eleven jurisdictions in the U.S. through the CDC-funded Variant, Atypical, and Resistance HIV Surveillance (VARHS) project. To date, no published study has looked at the successes and failures of ARVDRT, which could be used for improving HIV drug resistance surveillance methods.

To evaluate ARVDRT, we first assessed whether ARVDRT-eligible patients at contributing sites reflected the population of HIV-infected individuals diagnosed and reported to HIV surveillance authorities during that time period. Then, we looked at whether adequate quantities of leftover sera were available, whether the sera could be collected, frozen, and shipped to laboratories, once shipped, whether sera could be amplified (a necessary step for genotypic drug resistance testing), and whether primary care providers (PCP) could be identified and supplied with the results. We also examined factors that may have contributed to non-amplification, including plasma viral load, country of birth as a proxy for non-B subtypes, specimen volume, and the time between collection and freezing of samples.

Methods

Samples included in this study were collected from 2003-2007 by three ARVDRT sites: Colorado Department of Public Health and Environment, Illinois Department of Public Health, and Public Health – Seattle & King County. The fourth site was unable to participate due to lack of funding and other logistical reasons. Individuals who tested either confidentially (by providing a name) or anonymously (without giving their name) at a participating location and were newly-diagnosed with HIV-1 were eligible for ARVDRT. ARVDRT sites collected HIV sequences through one of two methods: either from ARVDRT surveillance genotype testing of remnant HIV diagnostic serum specimens or from clinical genotype test result reporting by commercial or other laboratories. ARVDRT surveillance conducted genotypic testing if (1) a remnant HIV-1 diagnostic specimen could be collected within three months of diagnosis to be used for genotyping, and (2) the patient was not known to have used ARVs either at the time of or preceding the collection of the remnant specimen (e.g. for post-exposure or pre-exposure prophylaxis).

In Colorado and Illinois, Stanford University performed all genotyping, while in King County both Stanford University and the University of Washington performed genotyping of serum. Genotyping labs were sent specimens with volumes as low as 0.1 milliliters (mL) until September, 2007, when a national protocol change dictated that volumes must be at least 0.5 mL. Samples with volumes too small to be sent to genotyping labs were recorded as quantity not sufficient (QNS) by King County. Illinois and Colorado only tracked outcomes of samples that were successfully sent for genotyping. ARVDRT sites either received genetic sequence information from the lab for samples that successfully amplified or were notified if the sample was contami-

nated or had not amplified. Labs conducted second attempts at amplifying samples when enough serum was left. For successfully amplified and genotyped specimens, ARVDRT sites provided an interpretation of the genotypic test results to the HIV testing facility. If the testing facility did not provide HIV-related primary care, results were also sent to an HIV-related medical care provider, if identified. ARVDRT sites noted whether the health care provider could be located and sent results.

King County also obtained genotype test results from patients whose doctors drew blood specifically for resistance testing and sent the specimen to one of the participating labs: Speciality, LabCorp, Quest, and University of Washington. These labs sent only genotypic sequence information, so King County did not receive information for specimens that did not amplify. King County was not responsible for sending private sector lab results to the primary care provider.

To determine the representativeness of ARVDRT, we compared demographic information for all ARVDRT-eligible individuals whose sample was collected at a participating site to all newly-diagnosed cases reported to the HIV/AIDS Reporting System (HARS) from 2003-2007 in Colorado, Illinois, and King County. The HARS comparison group included all eligible patients who were tested confidentially at a participating clinical site, whether or not their samples were able to be sent to the lab or amplified, as well as those tested at participating labs. We de-duplicated samples from confidential testers who were tested multiple times using their unique state surveillance identifier. Demographic information for confidential testers included in ARVDRT was gathered from HARS; however, this was not possible for anonymous testers. In King County and Colorado, where anonymous ARV resistance testing was offered, demographic information for anonymous testers was collected through medical record review or from the laboratory HIV test requisition form. We assessed differences in demographic information between newly-diagnosed HIV cases and ARVDRT-eligible individuals using a chi-square test for ordinal variables, or a Cochran-Armitage test for trend for nominal variables, with significance defined as any p-value <0.05.

In order to track the success of genotyping for all eligible individuals, we first determined what percentage had blood drawn specifically for genotyping with results reported from private sector non-ARVDRT labs and what percentage had testing done on remnant serum from an HIV test. From individuals with remnant serum samples in King County, where data was available, we calculated the percentage whose samples were never sent for genotyping because there was insufficient quantity available. Individuals for whom at least one sample was sent for genotyping were then divided into the percentages of those whose samples were able to be amplified and those whose did not amplify. Among those with amplified samples, we determined the proportion whose results were returned directly to their primary care provider.

Factors were considered that may have been associated with inability to amplify remnant serum samples sent for genotyping. Potential factors included: first measured viral load <1,000 copies per mL, volume of serum sent for genotyping <0.5 mL, time between serum collection and first freezing of the specimen >5 days, and if the patient was born outside of the United States. We included patients with unknown birthplaces and those recorded as having been born in the U.S. in the same category. Viral loads and birthplaces were determined by linking records to HARS, specimen collection dates were obtained from the laboratory requisition form, and specimen volumes and freezing dates were documented by laboratory technicians or health department staff members. We did not include anonymous testers and confidential testers missing identifiers in this analysis due to the high prevalence of missing information. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated using SAS version 9.1 (SAS Institute Inc, Cary, North Carolina). ORs estimate the relative risk of not amplifying for a group. For example, an OR of two indicates twice the risk of not amplifying. 95% CI that do not include one are considered statistically significant.

ARVDRT activities were initially approved by local and CDC Institutional Review Boards; however, ARVDRT was later given a non-research determination and thus all project areas closed their IRB reviews.

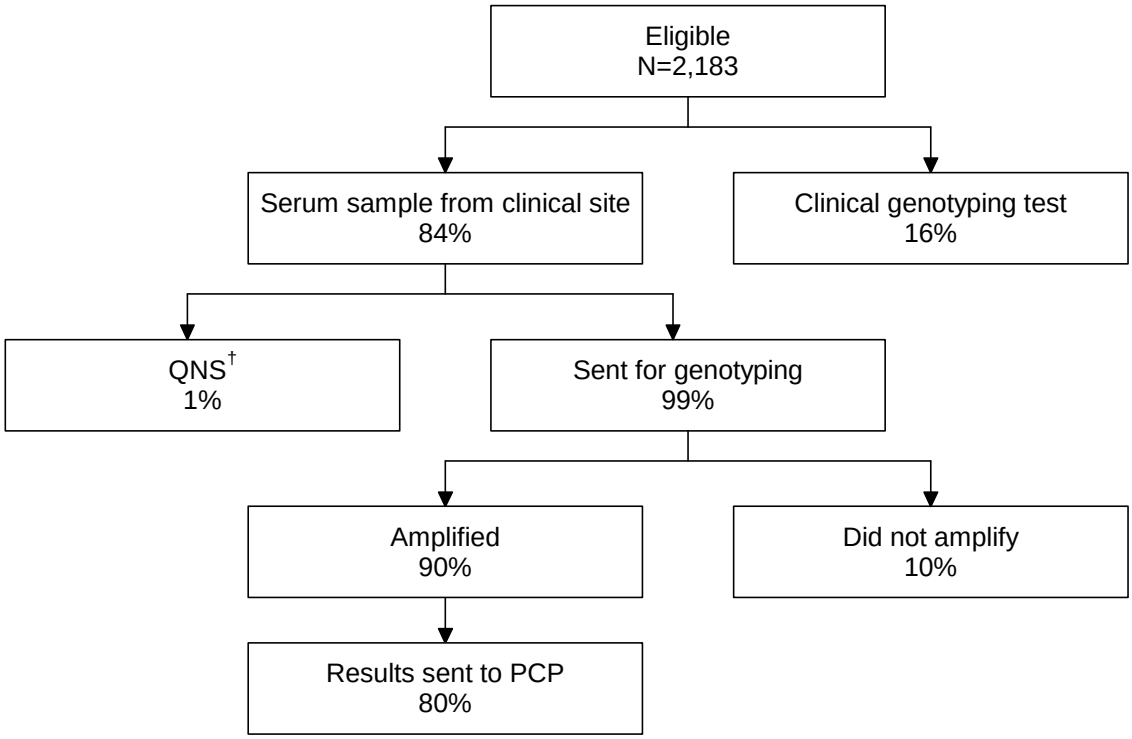
Results

In the three participating locations, 12,527 newly-diagnosed HIV-1 cases were recorded in HARS from 2003-2007. Of these, 2,183 (17%) were included in ARVDRT because the patient met eligibility criteria and had either a clinical genotype test done at a participating lab (16%) or had an HIV test conducted at one of the 165 participating clinical sites where remnant sera were collected for genotypic testing (84%) (**Figure 1**). Excluded from the analysis were 41 individuals in Illinois who were missing unique state identifiers. Between sites this inclusion rate varied between 55% (King County) and 7% (Illinois). Individuals included in ARVDRT, relative to those with reported HIV diagnoses for the same time period, were more likely to be: male ($p<0.001$), younger (< 30 years, $p=0.002$), White ($p<0.001$), a male who has sex with men (MSM), ($p<0.001$), and born outside of the United States or have an unknown country of birth ($p<0.001$) (**Table 1**).

A total of 1,856 samples were sent to either Stanford (n=1,627), UW (n=217), or both (n=12) from 1,831 individuals. Of the 1,831 ARVDRT-eligible individuals whose genotype was requested by the health department, 1,653 (90%) had a sample that was eventually able to be genotyped. In King County, 1% of individual's samples were not sent for genotyping because they had an insufficient quantity. Results for 80% were returned to a primary care provider (**Figure 1**). This rate ranged from 55% in King County to almost 100% in Illinois.

Among confidential testers with leftover serum sent for genotyping, factors associated with non-amplification included low specimen volume -- <0.5 mL (OR=3.93; 2.44-6.35), low viral load -- less than 1,000 copies per mL (OR=1.93; 1.04-3.56) and >5 days from specimen collection to freezing (OR=2.18; 1.51-3.16). Having been born outside of the U.S. (OR=1.44, 0.96-2.14) was not significantly associated with non-amplification (**Figure 2**).

Figure 1: Flow chart of overall genotyping success for all individuals eligible for the Antiretroviral Drug Resistance Testing (ARVDRT) Study, 2003-2007



† Results from Seattle/King County only

Discussion

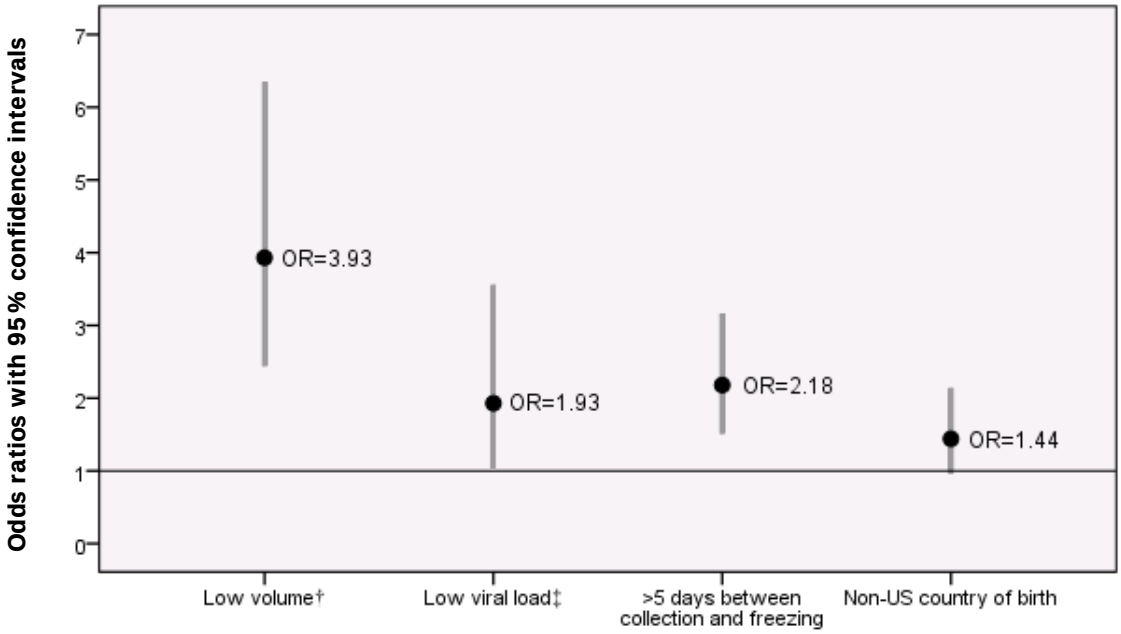
The ARVDRT project demonstrated that conducting sentinel surveillance of drug resistance is possible, and this analysis indicates areas where changes could improve the success of the project. Overall coverage of the surveillance system was low and over-represented younger individuals, Whites, and MSM, indicating a need to recruit more representative sites for participation. Among those who were ARVDRT-eligible with a diagnostic serum specimen available, 10% had no drug resistance results due to amplification failure. Addressing factors associated with non-amplification, including low specimen volume, and greater than 5 days between collection and freezing of samples could reduce wasted resources and missed opportunities for diagnosis of drug resistance.

Goals for resistance surveillance set by the CDC include 50% coverage of newly-diagnosed individuals who have been reported into HARS (15). Although this objective was met in King County, where results were collected from participating clinical genotyping labs as well as from testing of remnant specimens, the pilot

Table 1: Characteristics of persons who were eligible for the Antiretroviral Drug Resistance Testing (ARVDRT) Study compared with those who were included in the HIV/AIDS Reporting System (HARS), 2003-2007

	ARVDRT N (%)	HARS N (%)
	N = 2,183	N = 12,527
Sex		
Male	1,835 (85)	9,995 (80)
Female	330 (15)	2,531 (20)
Age at diagnosis of HIV		
0-19 years	54 (2)	430 (3)
20-29 years	640 (29)	3161 (25)
30-39 years	746 (34)	4,104 (33)
40-49 years	509 (23)	3,281 (26)
50-59 years	173 (8)	1,226 (10)
60+ years	48 (2)	325 (3)
Race/Ethnicity		
White	942 (45)	4,898 (40)
Black	668 (32)	5,189 (42)
Hispanic	388 (19)	1,929 (16)
Asian/Pacific Islander	63 (3)	237 (2)
Native American/Alaskan Native	12 (1)	57 (<1)
HIV Exposure Category		
Men who have sex with men (MSM)	1,251 (71)	6,446 (66)
Injection drug user (IDU)	102 (6)	1,143 (12)
MSM-IDU	163 (9)	523 (5)
Heterosexual contact	232 (13)	1,690 (17)
Other	4 (<1)	18 (<1)
Place of Birth		
Born in U.S.	1,416 (65)	9,919 (79)
Born outside U.S.	349 (16)	1,405 (11)
Birthplace unknown	419 (19)	1,203 (10)
HIV Testing Location		
Seattle/King County, Washington	N=899	N=1,629
Colorado	N=633	N=2,133
Illinois	N=651	N=8,765

Figure 2: Factors associated with non-amplification among confidential testers whose serum samples were included in the Antiretroviral Drug Resistance Testing (ARVDRT) Study, 2003-2007



† Low volume= < 0.5 mL
‡ Low viral load= < 1,000 copies per mL

project overall did not meet this objective. Since anonymous testers were included in ARVDRT but not HARS and could rarely be de-duplicated, the 17% coverage presented in this analysis may be an over– or an under-estimate. Differences in demographics between those included in ARVDRT and newly HIV-diagnosed individuals reported to HARS may reflect the over-representation of public testing sites in the surveillance system, including community venues targeting high risk groups such as MSM.

Although complete tracking information was not available for all ARVDRT sites, data from King County indicates that a small proportion of samples were not sent for genotyping due to their low volume, a comparatively greater percentage were shipped but unable to be amplified. For those whose samples could not be genotyped on the first attempt, a second sample was seldom available to be successfully amplified, indicating that a failure to amplify was a missed opportunity to determine an individual's resistance status. Although the primary objective of the surveillance system was to determine resistance rates on a population-level, informing medical providers of their patients' test results was another important goal of the system. The health departments included in this study sent all resistance test results back to the testing facilities and, in addition, located and sent test results to primary care providers for 80% of the patients. As 100% of results were also sent to the HIV testing facility, it is not known what proportion of primary care providers ultimately received test results for their patients–thus, 80% is a minimum. Determining how many patients received the results of their resistance testing is outside the realm of this analysis, but these results suggest that it was the majority of patients.

Factors associated with non-amplification of samples in ARVDRT were consistent with previous findings. Sample volumes between 0.1 and 0.5 mL were associated with nearly a three-fold decrease in amplification rates, which is why many HIV sequencing protocols recommend volumes of 0.5 mL or more.[16, 17] Greater than five days between collection and freezing was associated with more than a 50% decrease in amplification success rates, consistent with the evidence that the stability of HIV RNA decreases over time at room temperature.[18, 19] Low viral loads have also been shown to impact amplification success.[20, 21] In this analysis, samples from individuals with an earliest viral load of fewer than 1,000 copies/mL were associated with almost a 50% decrease in amplification success rates.

When ARVDRT completed the transition to VARHS in 2008, some changes were made, including addressing issues noted in this analysis. Anonymous testers were excluded from the surveillance system because of the inability to de-duplicate them and thus, accurately estimate transmitted resistance rates. The surveillance system was also expanded, both within jurisdictions through inclusion of more clinical sites and clinical testing laboratories and through the addition of more jurisdictions. As noted previously, remnant serum samples with volumes less than 0.5 mL were no longer sent to labs for genotyping. While these changes are justified given the analysis presented, further improvements could increase the success of this and future projects. Protocols could include more stringent requirements for timing between collection and freezing of samples. Laboratory advancements could also be utilized to improve amplification rates, including ultra-sensitive assays able to amplify specimens with low viral loads.[24] We recommend an increased effort on the part of the clinical sites to collect greater quantities of serum for diagnostic testing and to collect more information which could be used to locate a patient and determine where they end up in care. Through these improvements, surveillance sites could better utilize resources as well as collect and distribute more information about antiretroviral drug resistance.

Conclusion

This study demonstrates the accomplishments of the ARVDRT project and highlights areas where improvements could be made. Overall, ARVDRT showed that it was possible to utilize remnant diagnostic serum for routine drug resistance testing; however, adding clinical genotyping test results led to greater coverage and representativeness. Since sample volume, viral load, and timing between collection and freezing of samples are each associated with amplification success, we recommend that greater quantities of serum be collected at clinical sites, that protocols be implemented to more rapidly freeze samples, and that labs utilize technological advancements to amplify samples with low viral loads. These recommendations could be implemented in the current VARHS surveillance system or in future drug resistance surveillance systems.

Acknowledgements

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Deaths among HIV-infected people in King County, WA

Background

Well known advances in HIV treatment have led to dramatic improvements in the health and longevity of people living with HIV and AIDS (PLWHA). Yet each year sizable numbers of individuals still die prematurely with HIV infection. Public Health – Seattle & King County, in collaboration with community medical providers undertook a two part investigation of mortality for 2009. We also examined routine HIV surveillance data to look at risk of death among local PLWHA between 2008 and 2010.

Methods

Medical record review: We completed a detailed medical record investigation for deaths in 2009 among King County residents with HIV (PLWH). Deaths among non-residents and resident PLWHA who died out of King County were excluded. We reviewed hospital records for inpatient deaths and outpatient records of usual place of care (if different) for as many patients as resources allowed. Reviews collected date of HIV diagnosis, CD4 and viral load data, antiretroviral use and adherence; height and weight, length of residence in King County, co-morbidity, laboratory markers, prescription therapies (for diabetes, psychiatric illness, hypertension, hyperlipidemia), depression, substance use, and health services usage.

Medical provider interviews: We also completed interviews of a convenience sample of medical providers to collect information about their patients' deaths. Questions included an estimate of the length of time the provider was involved in the patients' care, cause of death, psycho-social factors around the time of death, assessments of whether the death was due to HIV, whether the death was preventable, the amount the patient was engaged in health care; whether the patient used antiretrovirals and degree of adherence, whether any illicit substance use was involved, was mental health an issue, and the roles of stigma and social isolation. Cause of death was determined by a combination of information from death certificates, chart review, and provider interviews.

Analysis of three years of deaths from HARS: The HIV/AIDS reporting system (HARS) is a Centers for Disease Control and Prevention (CDC) sponsored surveillance system designed to collect key information on people diagnosed with HIV infection, including date of death in the event of a death. Additional data collected include demographic factors (sex, age, race/ethnicity, HIV risk factors), residence (at time of HIV diagnosis, at time of AIDS diagnosis, current), and since 2006, all CD4 and viral load data. Deaths in a person with HIV infection are notifiable to the health department, but are more usually found through linkages with and searches of vital status and National Death Index records. Inclusion criteria for this analysis required (1) last contact (based on CD4 or viral load or HIV or AIDS diagnosis) 2008 or later; (2) HIV diagnosed 2010 or earlier; and (3) individuals not known to have relocated out of King County. Deaths included individuals who died 2008 through 2010 (although ascertainment of deaths for 2010 may still be somewhat incomplete); the comparison group of people living with HIV was comprised of individuals presumed to have been alive at the end of 2010.

Results

Medical record review and medical provider interviews for 2009: Of the 87 eligible cases, we completed chart reviews for 68 (78%) and interviews for 43 (49%) (**Figure 1**).

Cause of death: Of the 87 deaths (occurring in King County among King County residents), we were unable to determine the cause of death for four individuals (5%). Major causes of death among the remaining 83 included opportunistic illnesses (OI; n=30), cancers/ neoplasms (n=26), liver disease (n=12), pulmonary disease (n=11), heart disease (n=9), and self harm (n=9). These categories were not mutually exclusive, e.g., four individuals with hepatocellular carcinoma are included both in liver disease and neoplasm/cancer categories. Also AIDS-defining neoplasms are in both OI and cancer/neoplasm categories. (**Table 1**)

Figure 1: Number of death reviews completed, mortality review project, King County, WA, 2009

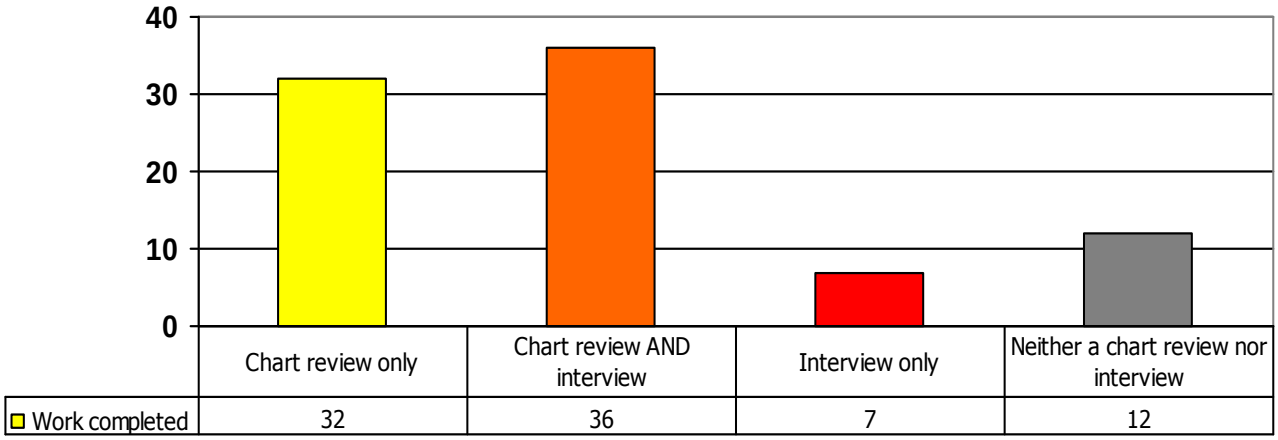


Table 1: Causes of death among people with HIV infection; 2009, King County, Washington (N=87)

Opportunistic illnesses (OI): 30 people, 32 OI diagnoses
- 7 AIDS-defining lymphomas as below (all but Hodgkin's)
- 6 Cytomegolovirus (CMV)
- 4 Mycobacterium avium complex (MAC)
- 3 Cryptococcosis
- 3 Pneumocystis pneumonia (PCP)
- 2 Wasting syndrome
- 7 Other (1 each: Kaposi's sarcoma/KS, pulmonary candidiasis, toxoplasmosis, TB, esophageal candidiasis, HIV encephalopathy, and progressive multifocal leukoencephalopathy/PML)

Cancer/neoplasms: 26 people, 27 diagnoses
- 8 Lymphomas (3 Burkitt's; 2 B cell; 1 each central nervous system/CNS, non-Hodgkins/NHL, and Hodgkin's)
- 6 Lung
- 4 Liver (hepatocellular)
- 4 Anal/rectal
- 1 Brain
- 1 Kaposi's sarcoma
- 3 Not otherwise specified (information from death certificate only)

Liver disease: 12 people 13 diagnoses
- 4 Liver cancers/neoplasms
- 3 Alcohol-related liver disease/cirrhosis
- 2 HCV related (including one with alcohol as well)
- 1 HBV related
- 1 Associated with fatty liver disease
- 2 Not otherwise specified

Pulmonary disease 11 people, 12 diagnoses
- 3 COPD
- 3 Pneumonia NOS
- 2 H1N1
- 2 MRSA pneumonia
- 1 Emphysema
- 1 Pulmonary hypertension

Heart disease: (N=9)
- 4 Myocardial infarctions or congestive heart failure
- 5 Artherosclerotic cardiovascular or hypertensive heart disease

Self harm (N=9)
- 4 Drug/alcohol poisoning without clear intent
- 2 Other outcomes from drug/alcohol use, such as injuries
- 2 Suicides
- 1 Sepsis & cellulitis from injection drug use

Other (excluding individuals with any of the factors above) (8 people, 9 diagnoses)
- 3 Cerebral/vascular (N=3) including stroke in setting of poorly controlled hypertension; coronary vascular accident (CVA) with polysubstance use, and massive subarachnoid cerebral aneurysms
- 1 Herpes zoster virus encephalopathy
- 1 Renal failure (also CVA)
- 1 Aspiration s/p head injury due to pedestrian car accident 1.5 year earlier
- 1 Sepsis
- 1 Fall with head injury
- 1 Ketoacidosis

Unknown: 4 people

We determined, in general, that death certificates alone were not adequate for cause of death categorization. Our investigations agreed with the death certificates for 42 (51%) of 82 deaths. Four areas of inadequacy were noted: (1) death certificates codes sometimes note conditions related to HIV without distinguishing whether or not these were AIDS-defining diagnoses. For example, "HIV resulting in multiple disease classified elsewhere" was used both for non-AIDS defining conditions (anal cancer and Hodgkin's lymphoma) and AIDS defining conditions (progressive multifocal leukoencephalopathy); (2) death certificate coding may miss death due to intentional self-harm. One example was a death by suicide with an ICD-10 code indicating: "other ill-defined and unspecified cause of mortality". (3) death certificates are frequently nonspecific; one example is a person who died with end stage liver disease and cirrhosis with the death certificate only including an ICD-10 code indicating "HIV resulting in multiple disease classified elsewhere & HIV not otherwise specified"; (4) death certificates frequently miss predisposing factors, such as, in the case of liver cirrhosis, missing the qualifiers of alcohol and hepatitis C in an ICD-10 code indicating "other and unspecified cirrhosis of liver".

Interview data: Medical provider data are summarized in **Table 2** including selected short quotes. Of note, roughly a third of deaths were deemed due to HIV, one-third were not, and the remaining third were intermediate. About half of the deaths might have been considered preventable. Nearly half had mixed or poor engagement in care; about a quarter were not on antiretrovirals; and among those using antiretrovirals, 80% had good adherence. Half of the deaths occurred in smokers; and nearly half used some other substance, including alcohol and marijuana. Over half had some psychiatric illness; most of these were depression, but sizable numbers of patients had bipolar disease and other psychiatric illnesses. Among the 13% with poor adherence (n=5), all also had substance use noted, including methamphetamine (2), heroin (1), polysubstance (1), and marijuana/prescription opiods (1). Social isolation was present in over one-third of the deaths and stigma may have had an impact among as many as 20% of the deaths.

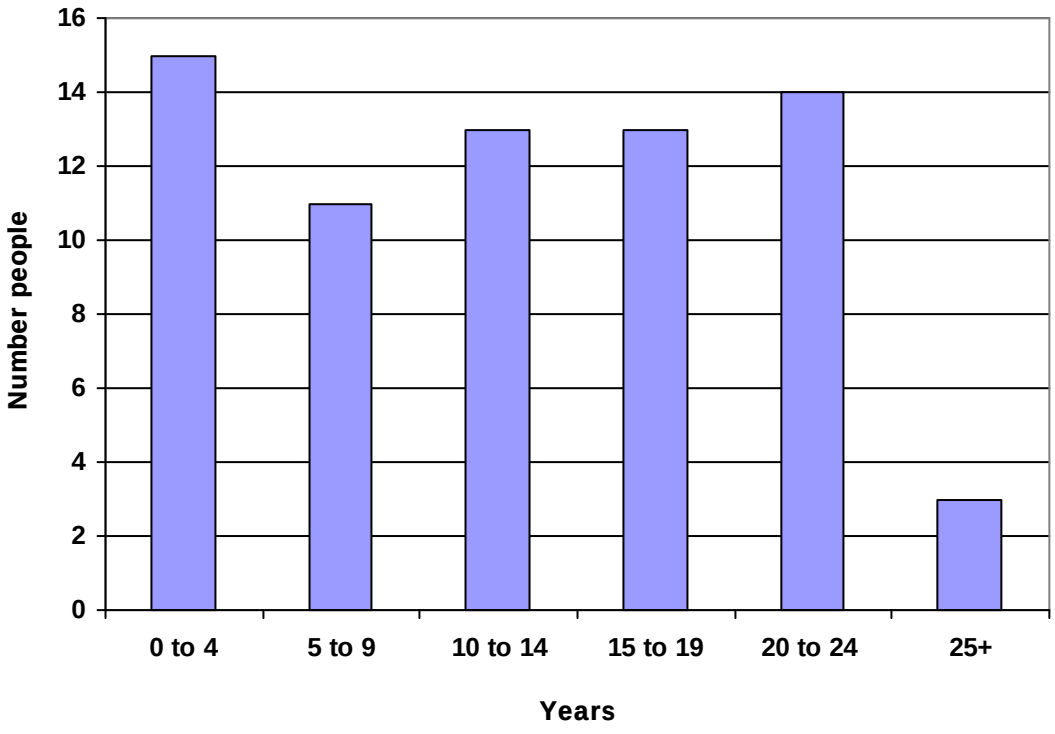
Table 2: Provider interviews data with selected quotes, HIV Deaths 2009, King County (N=44)

1. **Would you say this death was the death due to HIV? (N=37)**
   - Yes (n=12, 32%)
   - Partially or complicated by HIV (n=5, 14%)
   - Unlikely or mostly other factors (n=6, 16%)
   - No (n=14, 38%)
2. **Would you consider this a preventable death? (N=40)**
   - Yes (n=15, 8%)
   - Possibly (n=5, 12%)
   - No (n=20, 50%) Four interviews specifically mentioned smoking and one vaccination as factors that may have prevented the death. One provider mentioned a wait for mental health services as potentially contributory.
3. **How much would you say the patient was "engaged" in health care? (N=43)**
   - Well/good/very/fully (n=25, 58%) "very engaged and interested in being healthy" "no choice while living at SNF" "did everything that should have given him a long life"
   - Mixed (n=12, 28%) "not engaged until a few months before death" "semi-engaged"
   - Poorly (n=6, 14%) "not much to not at all" "poorly to not at all. He missed appointments often"
4. **Was the patient on antiretrovirals? (N=43)**
   - Yes (n=29, 67%)
   - Mixed (n=3, 7%) "history of use but stopped" "on and off" "just a couple of months"
   - No (n=11, 26%) "he was an elite controller" "CD4 count was still high" "declined"
5. **How adherent were they? (N=30 excluding unknown [2] and not applicable [10])**
   - Good to exceptional adherence (n=24, 80%) "very adherent and well suppressed" "perfect"
   - Mixed (n=2, 7%) "intermittently good" "spotty"
   - Poor (n=4, 13%) "hideously poor" "not at all adherent"
6. **Was any substance use involved? (N=44)**
   - Tobacco (n=21, 48%)
   - Alcohol (n=5, 11%)
   - Meth (n=5, 11%)
   - Marijuana (n=5, 11%)
   - Prescription opiates (n=3, 7%)
   - Other: Cocaine/IDU/polysubstance (n=5, 11%)
   - Any excluding tobacco (n=19, 43%)

Table 2 (continued): Provider interviews data with selected quotes (N=44):

7. **Was mental health an issue? (N=44)**
   - **Yes (n=25, 57%)**
     - Depression (n=19, 43%)
     - Bipolar (n=5, 11%)
     - Schizophrenia or other psychoses (n=3, 7%)
     - Post-traumatic Stress Disorder (PTSD) (n=3, 7%)
     - Paranoia (n=2, 4%)
   - **No (n=19, 43%)**
     - "nothing overt" "no formal diagnoses"
     - Includes two mentions of addiction; one "was a sad person", and one with anxiety
8. **What role, if any, would you give stigma (external, internal) in this death? (N=39)**
     - Minimal or none (n=25, 64%) "little if any" "not a big part" "minimal"
     - Mixed (yes but non-contributory) (n=6, 15%) "pretty marginalized but this did not impact care" "added to stress and disability but didn't impact care"
     - Some to significant (n=8, 21%) "yes hiding past from family" "did not disclose to family which may have contributed to long drug holidays" "some around body image"
9. **Would you say that social isolation, in any way, contributed to this death? (N=41)**
     - Yes (n=15, 37%) "very intentionally socially isolated" "definitely socially isolated and sometimes homeless"
     - Partially/possibly (n=7, 15%) "I don't think it contributed but he was kind of a loner" "modestly isolated"
     - No (n=19, 46%) "active with family and neighbors" "no, he had a very supportive partner who is still grieving"

Figure 2: Number of years between HIV diagnosis and death among 69 deaths, King County, WA, 2009



Medical record abstraction: The median period between HIV diagnosis and death was 11 years. Time from HIV diagnosis to death is shown in **Figure 2**. Of the 15 individuals who died within four years of an HIV diagnosis, four died within six months, an additional six died between 7 months and 1.5 years, three more died between 1.6 and 2.5 years, one person died between 2.6 and 3.5 years, and one died between 3.5 and 4 years.

We focused on health care utilization and immune function as measured by CD4 counts. As CD4 counts were generally recommended every three to four months, we also looked at frequency of CD4 counts as a proxy for regular care. Overall 46 individuals had no gaps in their medical records for the three years prior to death. Of these, 12 were diagnosed with HIV for two or fewer years prior to death. Of the remaining 34, numbers of CD4 counts within the three years prior to death are shown in **Figure 3**.

The mean most recent CD4 count was 221 (median 127). The mean (and median) CD4 counts one, two, and three years prior to death were 309 (276), 266 (164), and 212 (117) respectively. We examined three year and two year trends in mean CD4 levels. Of 38 with CD4 counts available in all three years, 16 had a non-linear pattern (going both up and down), 14 were consistently falling, and 8 were consistently rising. With 51 individuals, two years of CD4 counts were available and of these, 32 were falling and 19 rising.

Three years of death from the HIV/AIDS reporting system: 240 deaths occurred among 6,193 PLWH over the three year period 2008 through 2010. Individuals who died were, on average, older at the time of HIV diagnosis and at time of death relative to at time of last follow-up, and had been followed longer from HIV to death or last contact.

Individuals who died were more likely to be diagnosed with HIV earlier in calendar time, more likely to be IDU, more likely to have a lower CD4 count (both at time of HIV diagnosis and as a most recent test), and less likely to have low/undetectable viral loads (as their most recent test. Importantly, decedents were more likely to have a late diagnosis of HIV (being diagnosed with AIDS within one year of HIV diagnosis).

We also conducted a multivariate logistic regression analysis to look at factors associated with death (**Table 4**). As with the bi-variate analyses above, increased age, IDU status, and late diagnosis of HIV (AIDS within 12 months of HIV diagnosis) were all associated with death.

Figure 4 shows proportions who died according to HIV diagnosis year.

Figure 3: Number of CD4 count assays each year for three years prior to death (N=34), HIV deaths, King County, 2009

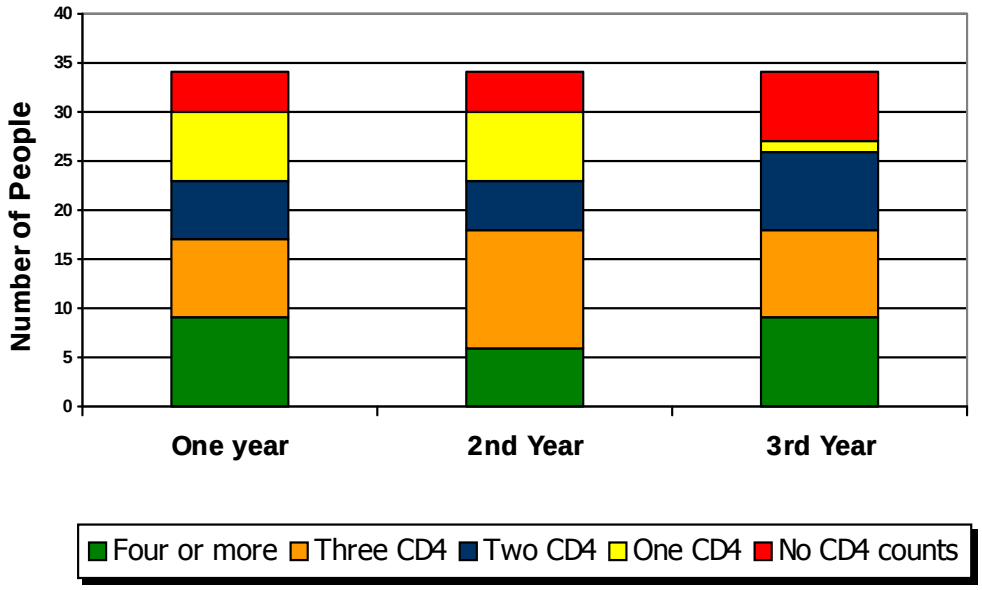


Table 3: Deaths and people living with HIV in King County, WA, 2008-2010

		Deaths N=240		Presumed Alive N=5953		
		N	%	N	%	P-value
Gender	Female	30	12	653	11	0.46
	Male	210	88	5300	89	
Age at HIV	0-12	0	0	37	1	<.0001
	13-19	2	1	96	2	
	20-29	38	16	1607	27	
	30-39	84	35	2476	42	
	40-49	74	31	1309	22	
	50-59	34	14	365	6	
	60+	8	3	63	1	
Age at last contact	0-12	0	0	10	<1	<.0001
	13-19	0	0	29	<1	
	20-29	3	1	412	7	
	30-39	19	8	1078	18	
	40-49	85	35	2303	39	
	50-59	83	35	1595	27	
	60+	50	21	526	9	
HIV risk mode	MSM*	124	52	4105	69	<.0001
	IDU*	40	17	297	5	
	MSM-IDU	30	12	481	8	
	Heterosexual	20	8	618	10	
	Other	3	1	50	1	
	Unknown	23	10	402	7	
Race/Ethnicity	Hispanic	17	7	596	10	.005
	Native Am.	6	2	67	1	
	Asian	8	3	200	3	
	Black	41	17	1049	18	
	Pacific Islander	0	0	17	<1	
	White	156	65	3925	66	
	Multi-racial	12	5	99	2	
First CD4	0-199	117	50	1865	32	<.0001
	200-499	79	33	2197	37	
	500+	40	17	1843	31	
	Unknown	4	--	50	--	
Most recent CD4	0-199	140	59	609	10	<.0007
	200-499	62	26	2277	39	
	500+	34	14	3019	51	
	Unknown	4	--	50	--	
Homeless at HIV	Yes	7	3	69	1	.02
	No	233	97	5884	99	
Most recent viral load	Very low to undetectable (<100)	110	50	4399	75	<.0001
	>=100	111	50	1488	25	
	Unknown	19	--	66	--	

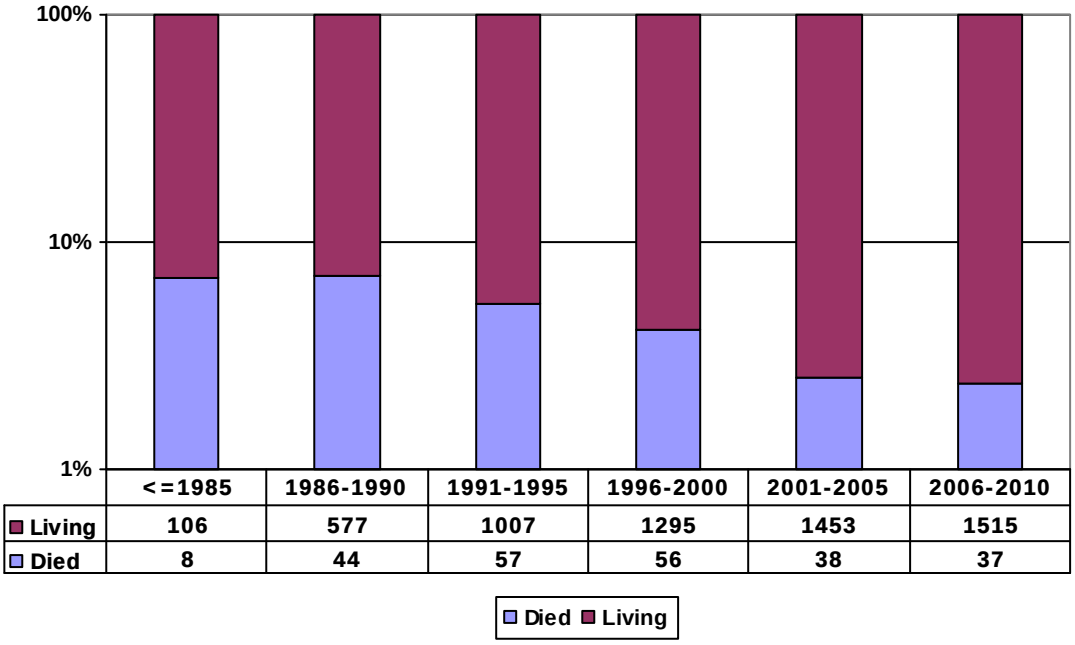
Table 3 (continued): Deaths and people living with HIV in King County, WA, 2008-2010

		Deaths N=240		Presumed Alive N=5953		
		N	%	N	%	P-value
HIV diagnosis Year	<=2005	203	85	4438	75	
	2006	2	1	286	5	
	2007	7	3	304	5	
	2008	17	7	306	5	
	2009	10	4	308	5	
	2010	1	<1	311	5	
Late HIV=Concurrent HIV & AIDS	Late	91	38	1471	25	<.0001
	Not late	149	62	4482	75	
Late HIV=AIDS within 6 months of HIV	Late	104	43	1678	28	<.0001
	Not late	136	57	4275	72	
Late HIV=AIDS within one year of HIV	Late	108	45	1822	31	<.0001
	Not late	132	55	4131	69	
Mean length follow-up (years)		11.9		10.6		
Median length follow-up (years)		12.0		10.0		
Range of follow-up		(0 to 27)		(0 to 30)		
Mean age at HIV diagnosis		39.9		35.0		
Median age at HIV diagnosis		39.0		34.0		
Range age at HIV diagnosis		(18 to 79)		(0 to 83)		
Mean current age		51.7		45.6		
Median current age		52		46		
Range current age		(27 to 85)		(5 to 87)		

Table 4: Logistic regression looking at demographic and clinical factors as predictors of mortality, King County, WA, 2008-2010

Factor	OR	95% CI
Each decade increase in age	1.663	1.4-1.9
MSM	0.549	0.4-0.8
IDU	2.364	1.7-3.2
Homeless status	1.722	0.8-3.9
AIDS within 12 months of HIV	1.816	1.3-2.5
Female	0.788	0.5-1.3
Latino	0.450	0.2-0.9
Black	0.452	0.3-0.8
White	0.582	0.4-0.9

Figure 4: Year of HIV diagnosis versus vital status in King County, WA, 2008-2010



	<=1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010
Living	106	577	1007	1295	1453	1515
Died	8	44	57	56	38	37

Discussion

Despite effective antiretroviral therapy, AIDS-defining opportunistic illnesses still occur and contribute to mortality among PLWHA. Increasingly non-AIDS conditions also contribute to deaths among local PLWHA, chief among these are suicides; lung, anal, and liver carcinoma; other neoplasms; and heart, liver, and kidney disease.

Future analyses will use Medical Monitoring Project (MMP) data to create a comparison group of PLWHA to evaluate the relative risk of smoking, heavy alcohol use and depression on the outcome of mortality. Abstraction of medical records to collect these data was challenging for a number of reasons, including difficulty in accessing medical records; extent of data collected; multiple medical facilities involved in the care of some patients; and patients receiving spotty medical care. After evaluating the importance of various elements of the data collection form, we plan to streamline the form to capture major causes of death (cancers, hepatic, pulmonary) with major contributors (late antiretroviral initiation, refusal of antiretrovirals, smoking, other drug use) and pilot this shorter form with 2010 deaths.

- *Contributed by Susan Buskin, David Aboulafia, Bob Wood, and Jim Kent*

Highlights from the 2010 Seattle area NHBS survey of persons at increased risk of heterosexually transmitted HIV infection

In the United States an estimated 42,793 persons were diagnosed with HIV infection in 2009 in the 40 states with HIV reporting since at least January, 2006.[1] Almost one-third (31%) of these cases occurred as a result of heterosexual transmission, including 85% of females cases and 14% of male cases. There are considerable racial disparities in HIV infection. In 2009, the estimated rate of new HIV diagnoses in African American males nationwide was 122/100,000 compared to 15/100,000 among White males and 33/100,000 among all males. Twenty percent of cases among African American males were attributed to heterosexual transmission compared to 4% of cases among White males and 14% of cases among all males.[2] Among African American females, the estimated 2009 HIV rate was 48/100,000 compared to 2/100,000 among White females and 10/100,000 among females of all races. Transmission patterns vary across the country. In King County where male-to-male sexual contact is the predominant transmission route, 12% of the 939 cases diagnosed 2008-2010 were attributed to heterosexual contact.[3] Heterosexual transmission accounted for 3% of cases among males and 66% of cases among females with about one-quarter (22%) of the cases having been born outside the U.S.

The Centers for Disease Control and Prevention (CDC) sponsors the National HIV Behavioral Surveillance (NHBS) System to monitor HIV-related risk behaviors and seroprevalence and assess the use of prevention services in three groups at increased risk for HIV infection: men who have sex with men (MSM), injection drug users (IDU) and heterosexuals (HET).[4] Each population is surveyed every third year using a common protocol and core questionnaire. Twenty-one Metropolitan Statistical Areas (MSAs) participated in the 2010 NHBS-HET2 survey. These MSAs were chosen based on the number of HIV/AIDS cases and represented approximately 60% of all AIDS cases in large urban areas in 2008. This report describes findings from the 2010 Seattle area NHBS-HET2 survey.

Methods

The aim of NHBS is to survey populations at highest risk for HIV. While the NHBS MSM and IDU survey populations are defined by behaviors (male-male sex and injection drug use) which are directly associated with HIV transmission, there is no analogous behavioral definition for the NHBS HET population. To develop a definition, CDC conducted a review of the literature, held a series of expert consultations and analyzed data from the 2006-2007 HET1 pilot study in 24 NHBS sites.[5] Heterosexuals at increased risk can be defined by their individual risk factors, the risk factors of the members of their sexual networks, or by the social-structural context in which they live or socialize. CDC judged that social-structural variables were the most effective way to identify a representative sample of heterosexuals at increased risk of HIV. The definition targets persons of low socioeconomic status, which is defined as having an income that is not above the Department of Health and Human Services poverty guidelines, or whose educational attainment is not greater than high school.

NHBS-HET2 used respondent-driven sampling (RDS) to recruit participants. RDS is a form of snowball sampling where participants are paid a small incentive to recruit a limited number of their network members to the study. Recruitment starts with a small number of participants ("seeds") of diverse sociodemographic characteristics who are asked to recruit 3-5 of their peers for the study. These referrals are screened for eligibility and those who complete the study are asked to recruit a new wave of participants. RDS is based on the theory that if peer recruitment proceeds through a sufficiently large number of waves, the composition of the sample will overcome any bias that may have been introduced by the nonrandom selection of seeds.[6,7] RDS data can be adjusted during analysis to reduce biases associated with differential recruitment patterns and network sizes to produce population-based prevalence estimates of variables of interest. We did not adjust the data for this report as no convincing and generally recognized method has emerged for determining p values in statistical testing or conducting multivariate analyses using adjusted RDS estimates.

Following the CDC protocol, we used mapping to identify and describe census tracts where at least 20% of the households had incomes below the federal poverty level to help guide decisions on interview field office location and recruitment of seeds. In King County 21 of the 373 census tract met the poverty criteria. These 21 census tracts were scattered across areas of Downtown and South Seattle and South King County. We

also mapped HIV and gonorrhea rates and educational attainment to help inform our decisions. We located our interview office in South Seattle.

Potential participants were screened for eligibility. Those who met the study eligibility criteria of being 18 to 60 years of age, having had sex with a person of the opposite gender in the past 12 months, living in King or Snohomish County, and being able to complete the survey in English were invited to participate in the study. After obtaining informed consent, study interviewers administered a 30-40 minute risk behavior survey using hand held computers to record responses. Participants were offered HIV counseling and rapid testing. At the end of the study session they were given coupons to distribute to members of their networks. They received a monetary incentive and information about HIV prevention and social and health services. No names were collected and the study was approved by the Washington State Institutional Review Board.

Results

Recruitment: We recruited seven seeds residing in five different census tracts that met the poverty criterion. Five of the seeds provided referrals leading to a total of 585 eligible participants over 15 waves of recruitment. Eighty-nine percent of the referrals derived from a single seed. For this analysis we focused on participants of low socioeconomic status according to the CDC definition and excluded men who reported ever having sex with men and persons who reported ever injecting drugs, leaving data from 453 participants (including seeds) for inclusion in the analysis .

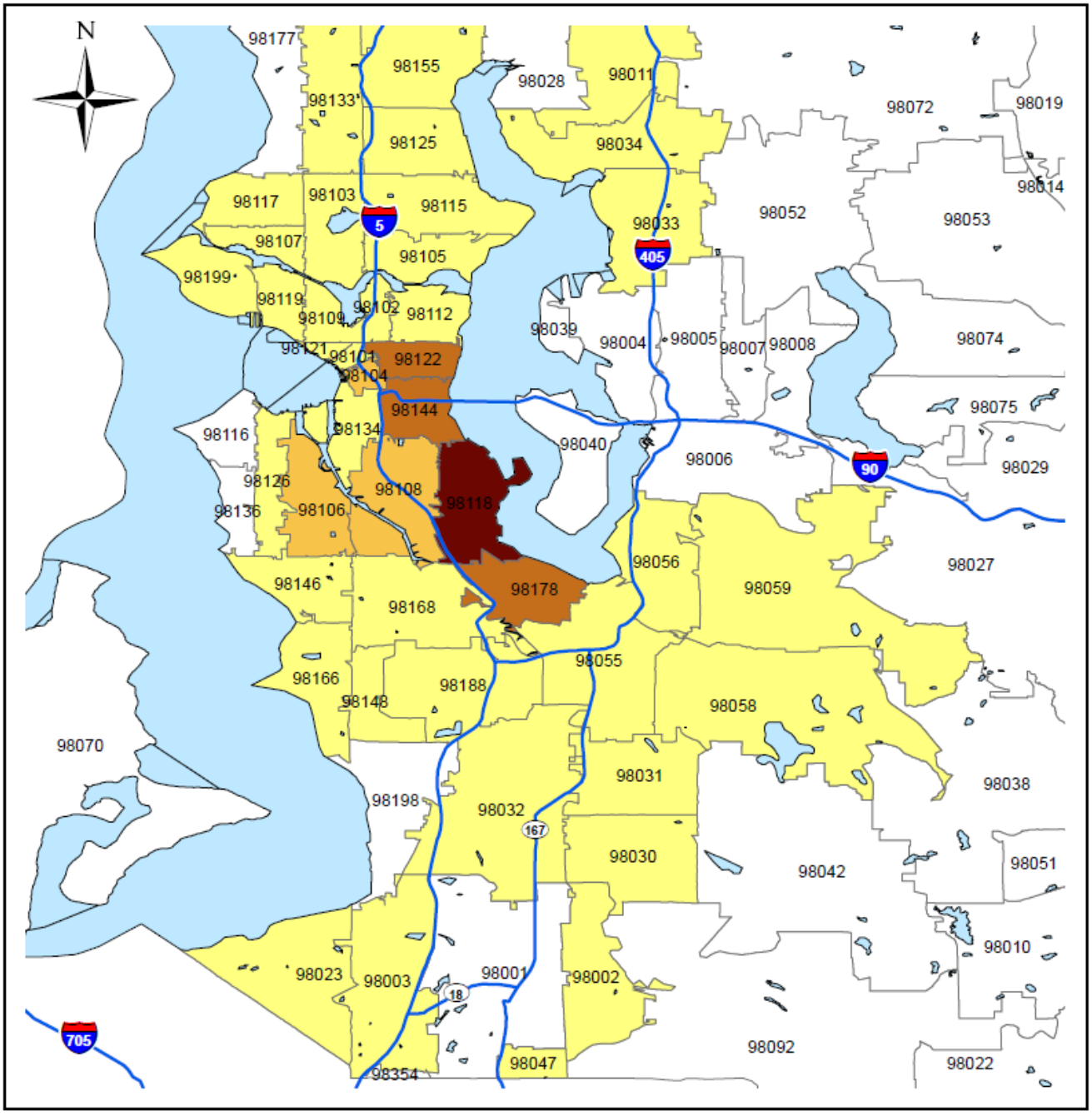
Table 1: Demographic characteristics of participants in the 2010 Seattle area NHBS-HET2 survey

	2010 NHBS-HET2		King County population[1]
	N	%	
Total	**453**	**100%**	**1,224,962** (18-60 years)
Gender			
Male	223	49%	51%
Female	230	51%	49%
Age (years)			
18–29	180	40%	29%
30–39	78	17%	24%
40–49	126	28%	24%
50–60	69	15%	24%
Race/ethnicity			
White, non-Hispanic	35	8%	71%
Black, non-Hispanic	304	67%	6%
Hispanic	24	5%	7%
Native American	9	2%	1%
Asian/Pacific Islander	13	3%	14%
Multiple races	68	15%	2%
Foreign-born			
Yes	24	5%	19%

[1] The gender, age and race/ethnicity data are 2009 population estimates for King County residents aged 18-60 years old from Population Estimates for Public Health Assessment, Washington State Department of Health and Krupski Consulting. December 2009.

The information on foreign-born residents (2005-2009) is from the U.S. Census State and County Quick Facts available at http://quickfacts.census.gov/qfd/states/53/53033.html.

Figure 1: Resident zip codes of participants in the 2010 Seattle area NHBS-HET2 survey.



Number of participants

- 1 - 9
- 10 - 26
- 27 - 56
- 57 - 119

Demographic and socioeconomic characteristics: The 453 participants resided in 48 different zip codes and 124 different census tracts (**Figure 1**). Eighty-eight (19%) of participants resided in one of the 21 high poverty census tracts. Fifty-eight percent of the participants came from zip codes 98122, 98118, 98144 and 98178 located in Central and South Seattle. Of the 453 participants about half were male and half were female (**Table 1**). The median age was 36 years and slightly younger than the King County population of 18 to 60 year olds. The sample was predominantly African American (67%), compared to African Americans comprising just 6% of the King County population. Among the 68 (15%) who reported being multiracial, 44 (65%) reported being African American and Native American. The HET2 sample was less likely to be foreign-born (5%) than the King County population as a whole (19%). Educational attainment and income were much lower than the general population, which was consistent with the eligibility criteria for the sample (**Table 2**). Seventy-two percent had graduated from high school compared to 92% countywide and 18% had education beyond high school compared to 77% of the 25-44 year old population. Thirty-five per-

Table 2: Socioeconomic characteristics of participants in the 2010 Seattle area NHBS-HET2 survey

	2010 NHBS-HET2		King County population[a]
	N	%	
Total	**453**	**100%**	**1,224,962** (18-60 years)
Education			
Less than high school	127	28%	
High school	245	54%	92%
Post high school	81	18%	77% (25-44 year old pop.)
Yearly income			
<$5,000	149	33%	Per capita $37,797
$5,000 - $9,999	140	31%	
$10,000 - $19,999	109	24%	
$20,000+	55	12%	
Employment status			
Disabled for work	103	23%	
Unemployed	158	35%	8%
Full or part time	108	24%	
Other	84	19%	
Health insurance			
None	181	40%	14%
Private	27	6%	
Medicaid/Medicare	207	46%	
Other	36	8%	
Marital status			
Never married	299	66%	
Divorced/separated/widowed	112	25%	
Married/domestic partner	42	9%	
Homeless[b]			
Currently	115	25%	
Other time last 12 months	106	23%	
Not homeless last 12 months	232	51%	
Incarcerated			
Last 12 months	114	25%	

[a] High school graduates (persons 25+ years) and income per capita (2009 dollars) are for 2005-2009, U.S. Census State and County Quick Facts. Available at http://quickfacts.census.gov/qfd/states/53/53033.html. Post high school education, employment, health insurance are from University of Wisconsin County health rankings. Available at http://www.countyhealthrankings.org/washington/king.

[b] Homeless was defined as "living on the street, in a shelter, a single occupancy room hotel, temporarily staying with friends or relatives, or living in a car."

cent of the sample was unemployed compared to 8% of the general King County population and 40% lacked health insurance compared to 14% of the general population. Half reported being homeless either currently or at some point in the last 12 months. The survey used a broad definition for homeless, including "temporarily staying with friends or relatives." One-quarter had been incarcerated in the last 12 months.

Substance use behaviors: Almost three-quarters of the sample reported use of an illicit drug during the last 12 months (**Table 3**). The most common drug was marijuana (62%) followed by crack cocaine (25%), powdered cocaine (18%), and painkillers (15%). Forty-five percent reported binging on alcohol at least once in the last 30 days and 28% reported binging on four or more occasions. Half of the sample had been in drug or alcohol treatment, including 21% in the last 12 months.

Sexual Identity and Sexual Behaviors: Among women, 20% identified as bisexual and 1% as lesbian (**Table 4**). All men reported being heterosexual due to exclusion of men who had sex with men. Almost three-quarters of the sample reported more than one sex partner and one-quarter reported five or more sex partners in the last year. In the last 12 months half of the sample reported more than 2 casual partners ("someone you don't feel committed to or don't know very well or someone you have sex with in exchange for things like money or drugs"). A series of more detailed questions asked about the last sexual encounter. Over half of the sample did not know the HIV status of their last sexual partner with whom they had vaginal sex even though 65% reported that their last sex partner was a main partner ("someone you feel committed to above anyone else"). Condom use at last sex was more common with casual than with main sex partners (43% vs. 18%). Among those with 2 or more sex partners in the last year, 30% reported condom use at last vaginal sex (data not shown). Overall 38% reported unprotected vaginal intercourse (UVI) with a partner of unknown HIV status at their last sexual encounter, including 35% of those whose last partner was a main partner and 46% of those whose last partner was a casual partner. Only one participant reported UVI with a partner who was HIV-positive. Sixty-three percent reported having concurrent sexual relationships based on responses to questions of the form "During the past 12 months when you were having sex with this [i.e. your last] partner, did you have sex with other people?".

Table 3: Substance use behaviors among participants in the 2010 Seattle area NHBS-HET2 survey

Substance use behaviors last 12 months (unless otherwise noted)	N=453	
	N	%
Any non-injection drug use		
Yes	324	72%
Use of most common drugs		
Marijuana	282	62%
Crack cocaine	113	25%
Powdered cocaine	83	18%
Methamphetamine	29	6%
Ecstasy	58	13%
Downers (i.e., Valium, Ativan, Xanax)	32	7%
Painkillers (i.e., Oxycontin, Vicodan, Percocet)	68	15%
Alcohol use		
Last year	384	85%
Binged 4+ times in last 30 days[a]	129	28%
Drug or alcohol treatment		
Never	219	48%
Yes, but not in the last 12 months	140	31%
Yes, in the last 12 months	94	21%

[a] Four or more drinks in one setting for women and five or more drinks in one setting for men.

Table 4: Sexual identity and behaviors among participants in the 2010 Seattle area NHBS-HET2 survey

	Males N=223		Females N=230		Total N=453	
	N	%	N	%	N	%
Sexual identity						
Heterosexual	223	100%	182	79%	405	89%
Homosexual, gay or lesbian	0	0	2	1%	2	0.4%
Bisexual	0	0	46	20%	46	10%
Last 12 months						
Number of sex partners						
1	49	22%	78	34%	127	28%
2-4	104	47%	104	45%	208	46%
5+	70	31%	48	21%	118	26%
Number of main sex partners						
0	54	24%	40	17%	94	21%
1	114	51%	144	63%	258	57%
2-4	53	24%	43	19%	96	5%
5+	2	1%	3	1%	5	1%
Number of casual sex partners						
0	59	26%	88	38%	147	32%
1	32	14%	50	22%	82	18%
2-4	80	36%	60	26%	140	31%
5+	52	23%	32	14%	84	19%
Last sexual encounter						
Type of partner[a]						
Main partner	135	61%	158	69%	293	65%
Casual partner	88	39%	72	31%	160	35%
HIV status of sex partner (vaginal sex) [b]						
Negative	112	52%	89	41%	201	47%
Unknown	102	48%	129	59%	231	53%
Condom use for vaginal sex						
Overall	62	29%	54	25%	116	27%
Main partner	27	20%	26	17%	53	18%
Casual partner	35	43%	28	43%	63	43%
Unprotected vaginal sex with partner of unknown HIV status						
Overall	72	34%	94	43%	166	38%
Main partner	38	29%	62	40%	100	35%
Casual partner	34	42%	32	50%	66	46%
Concurrent sex						
No	79	35%	88	38%	167	37%
Yes	144	65%	142	62%	286	63%
Substance use						
No alcohol or drug use	103	46%	125	54%	228	50%
Alcohol	60	27%	58	25%	118	26%
Drugs	16	7%	8	3%	24	5%
Both alcohol and drugs	44	20%	39	17%	83	18%

[a] Casual sex partner: Someone you don't feel committed to or don't know very well or someone you have sex with in exchange for things like money or drugs. Main sex partner: someone you feel committed to above anyone else. This is a partner you would call your girlfriend/boyfriend, wife/husband, significant other or life partner.

[b] Among the 432 who reported vaginal sex at last sexual encounter.
Categories may not add up to total because of missing data for individual variables.

Half reported use of alcohol (26%), drugs (5%) or both alcohol and drugs (18%) at their last sexual encounter.

Associations of high risk sexual behaviors at last sexual contact were examined using logistic regression analysis to control for sociodemographic variables among the 432 (95%) participants who had vaginal sex at their last sexual contact. The outcome variable "high risk sexual behavior" was defined as UVI (without a condom) with a partner of unknown HIV status at last sexual encounter (the one participant who reported an HIV-positive sex partner was excluded from this analysis). Age and gender were the only sociodemographic variables significantly and independently associated with such high risk sex in logistic regression models. Women were more likely than men to report UVI with a partner of unknown HIV status, as were persons 30 years and older compared to those younger than 30 years (**Table 5**). After control for age and gender, participants who reported two or more casual sex partners in the last 12 months, use of methamphetamine, downers, or painkillers in the last 12 months, or binging on alcohol on at least four occasions in the last 30 days were significantly more likely to report UVI with a partner of unknown HIV status at their last sexual contact.

HIV prevalence and testing and other health issues: Five (1.1%) of the 444 participants who consented to HIV testing tested HIV-positive. They included three participants with confirmatory test results and two with reactive results on the rapid test who refused confirmatory testing (**Table 6**). HIV prevalence was 0.5% among males and 1.8% among females. If the two reactive rapid tests without confirmatory results are excluded then HIV prevalence was 0.7% overall and 0.5% in males and 0.9% in females.

Table 5: Factors associated with high risk sex (unprotected vaginal sex with partner of unknown HIV status at last sexual encounter) among participants in the 2010 Seattle area NHBS-HET2 survey

Total[a]	n/N	%	OR[b]	95% CI	p-value
	166/432	38%			
Gender					
Male	72/214	34%	1.0		
Female	94/218	43%	1.6	1.1 – 2.4	0.2
Age (years)					
18-29	45/177	25%	1.0		
30-39	34/73	47%	2.6	1.5 - 4.6	0.001
40-49	57/121	47%	2.7	1.7 – 4.5	<0.001
50-60	30/61	49%	3.0	1.6 – 5.5	0.001
Number of casual partners last 12 months					
0	42/144	29%	1.0		
1	31/81	38%	1.5	0.9 – 2.8	0.15
2-4	56/132	42%	2.0	1.2 – 3.4	0.01
5+	37/75	49%	2.5	1.4 – 4.6	0.002
Methamphetamine last 12 months					
No	150/405	37%	1.0		
Yes	16/27	59%	2.4	1.1 – 5.6	0.04
Downers last 12 months					
No	147/402	37%	1.0		
Yes	19/30	63%	3.1	1.4 – 6.9	0.01
Painkillers last 12 months					
No	132/368	36%	1.0		
Yes	34/64	53%	2.0	1.2 – 3.6	0.01
Alcohol binge 4+ times last 30 days					
No	101/314	32%	1.0		
Yes	65/118	55%	2.8	1.8 – 4.4	<0.001

[a] Among 432 participants who reported vaginal sex with a person of opposite sex at their last sexual encounter.
[b] All odds ratios are controlled for sex and age.

Two participants reported already knowing their HIV-positive status. All five positive participants were born in the U.S. and one resided in a high poverty census tract.

Seventy-nine percent reported having visited a health-care provider in the last 12 months and of those 34% had been recommended HIV testing. Overall, 80% had ever been tested for HIV, including 29% in the last 12 months. Participants reported getting their most recent test in a number of different places including community health centers (14%), public health clinics (13%), family planning or OB/Gyn providers (13%), or hospitals (inpatient) (11%). Female participants were more likely than males to have tested at the last two types of locations whereas males were more likely than females to have tested in a correctional facility. Few had participated in individual level (10%) or group level (8%) HIV prevention programs in the last 12 months (data not shown).

Female participants were more likely than male participants to report a diagnosis with a sexually transmitted disease in the last 12 months (17% vs. 3%) and more

Table 6: HIV and health-related characteristics among participants in the 2010 Seattle area NHBS-HET2 survey

	Males		Females		Total	
HIV status[a]	**N=217**	**%**	**N=227**	**%**	**N=444**	**%**
Negative by serology	216	99%	222	98%	438	99%
Positive by serology (rapid test)	1	0.5%	4	1.8%	5	1.1%
Positive by serology (confirmed)	1	0.5%	2	0.9%	3	0.7%
Self-reported HIV-positive	1	0.5%	1	0.4%	2	0.5%
Most recent HIV test	**N=222**	**%**	**N=228**	**%**	**N=450**	**%**
0-6 months	36	16%	42	19%	78	17%
7-12 months	25	11%	29	13%	56	12%
13-24 months	28	13%	39	17%	67	15%
> 24 months	82	37%	77	34%	159	35%
Never	51	23%	41	18%	92	20%
Location of most recent HIV test in last 5 years	**N=133**	**%**	**N=152**	**%**	**N=285**	**%**
Community health center	19	14%	21	14%	40	14%
Public health clinic	20	15%	18	12%	38	13%
Family planning or OB/Gyn	4	3%	34	22%	38	13%
Hospital (in-patient)	10	8%	21	14%	31	11%
Private healthcare provider	15	11%	13	9%	28	10%
Correctional facility	17	13%	8	5%	25	9%
STD clinic	9	7%	13	9%	22	8%
HIV testing site or outreach	11	8%	8	5%	19	7%
Other	28	21%	16	11%	44	15%
Other health issues	**N=223**	**%**	**N=230**	**%**	**N=453**	**%**
STD last 12 months	7	3%	39	17%	46	10%
Self-reported hepatitis C positive	11	5%	16	7%	27	6%
Hepatitis B vaccination	70	31%	108	49%	178	39%
HPV vaccine[b]			**N=100**	**%**		
Yes	NA	NA	45	45%	NA	NA

[a] Among 444 who consented to HIV testing.
[b] Among females 30 years or younger. Recommended for females 9-26 years of age since June 2006.

likely to have been vaccinated against hepatitis B (49% vs. 31%). Vaccine for human papillomavirus (HPV) was licensed for use in 9-26 year old females by the Food and Drug Administration in June 2006. Among the 100 female participants 30 years or younger in our study who would have been eligible for HPV vaccine, 45 (45%) reported having been vaccinated, including 56% of 18-24 year olds and 22% of 25-30 year olds. Only 2% of females who were not eligible for HPV vaccine reported vaccination. The vaccine was licensed for males 9-26 years old in October 2009 and none of the men in the relevant age group in our study reported vaccination.

We also examined factors associated with having had an HIV test in the last 12 months after control for sociodemographic variables in logistic regression analyses.

Marital status and foreign birth were the only two sociodemographic variables that were significantly and independently associated with having had an HIV test in the last 12 months. Those who were divorced or separated were less likely to have had an HIV test in the last year compared to those who were never married as were those who were born abroad compared to those born in the U.S. Variables that remained significantly associated with testing after control for marital status and foreign birth are listed in **Table 7**. We found that participants who did not have a main partner in the last year, whose last sex partner was a casual partner, who reported UVI with a partner of unknown HIV status at last sexual contact, or who reported alcohol binge on at least four occasions in the last 30 days were less likely to have had an HIV test in the last 12 months.

Table 7: Factors associated with having an HIV test in the last 12 month among participants in the 2010 Seattle area NHBS-HET2 survey

	n/N	%	OR[b]	95% CI	p-value
Total[a]	132/450	29%			
Marital status					
Never married	100/297	34%	1.0		
Divorced/separated	21/111	19%	0.5	0.3 – 0.8	0.006
Married/domestic partner	11/42	26%	0.8	0.4 – 1.7	0.53
Country of birth					
United States	129/425	30%	1.0		
Other country	2/24	8%	0.7	0.5 – 0.99	0.04
Any main sex partners last 12 months					
No	18/93	19%	1.0		
Yes	114/357	32%	1.9	1.1 – 3.4	0.03
Type of last sex partner					
Main	96/291	33%	1.0		
Casual	36/159	23%	0.6	0.4 – 0.98	0.04
UVI with partner of unknown HIV status at last sexual contact[c]					
No	89/264	34%	1.0		
Yes	37/165	22%	0.6	0.4 – 0.9	0.03
Alcohol binge 4+ times last 30 days[d]					
No	106/323	33%	1.0		
Yes	26/127	20%	0.6	0.4 – 0.97	0.04

[a] Data from 2 persons who self-reported being HIV-positive were excluded from analyses.
[b] All odds ratios are controlled for marital status and foreign birth.
[c] UVI = Unprotected (without a condom) vaginal intercourse.
[d] Four or more drinks in one setting for women and 5 or more drinks in one setting for men.

Comments

CDC based its definition of the NHBS HET survey population on the proposition that populations of lower socioeconomic status are at elevated risk for heterosexually transmitted HIV. This is supported by HIV case reporting data which show that heterosexually acquired HIV cases are disproportionately African American and Hispanic (groups associated with higher levels of poverty).[8,9] An analysis of data from the 24 HET1 NHBS sites indicated that among a study population of low socioeconomic status, HIV prevalence was highest among those with lower educational attainment, the unemployed, and those with incomes below the poverty level.[5] The Seattle-area NHBS-HET2 survey successfully recruited a study population with low income and educational attainment and high levels of homelessness, unemployment and incarceration, which constitute a group presumed to be at risk for heterosexually transmitted HIV.

The Seattle-area NHBS-HET2 population reported elevated levels of sexual and drug-associated risk behaviors. The majority (72%) reported 2 or more sex partners in the last year compared to 9% of 15-44 year old females and 18% of 15-44 year old males in the National Survey of Family Growth (NSFG) and 30% of participants with 2 or more sex partners in the last year used a condom at last sex compared to 51% in the 2006 Washington State HIV Knowledge Attitudes and Beliefs (KAB) survey.[10]

While 80% of HET2 participants reported ever testing for HIV, (well above the results for the general population reported by the Behavioral Risk Factor Surveillance System),[11] participants who practiced sexual behaviors that put them at higher risk for HIV were also less likely to have tested for HIV. Use of non-injection drugs and binge drinking were much more prevalent in our survey than among the general population. According to the 2008 National Surveys on Drug Use and Health (NSDUH), 12%-16% of the Washington State population 12 years and older reported use of marijuana in the last year compared to 62% of HET2 participants.[12] Cocaine use was reported by 2%-3% of the NSDUH sample and 18% of the HET2 sample and 15%-22% of the NSDUH sample reported binging on alcohol in the last 30 days compared to 45% of the HET2 sample.

HIV prevalence was 1.1% in NHBS-HET2, the same prevalence seen in Seattle in the 2007 NHBS-HET1 survey (which had been recruited by venue-based sampling rather than by RDS).[13]

The Seattle HIV prevalence was similar to that in NHBS-HET2 sites in the western region (0.8%) but well below that seen in the Northeast (3.1%). It compares to an estimated 0.04% among heterosexual adults in King County overall and an estimated 0.1% among heterosexual native-born African Americans in King County.

The NHBS-HET1 survey revealed an HIV prevalence of 5.2% among participants in Washington, D.C.[14] This led to the declaration of a generalized HIV epidemic among heterosexuals in Washington, D.C. and raised concern about the potential for the rapid spread of heterosexually transmitted HIV throughout the U.S. In King County there is currently little evidence for increasing rates of heterosexual transmission. In fact the number of heterosexually transmitted cases reported in King County has fallen from 142 in 2002-2004 to 100 in 2008-2010. There is some evidence that in King County, as elsewhere, that low socioeconomic status is associated with heterosexually transmitted HIV. King County heterosexual cases are disproportionately Black (including 34% of U.S.-born and 72% of foreign-born cases) and we previously found a modest but statistically significant correlation between the rate of reported heterosexual HIV cases and the proportion of households living below the poverty level in those King County census tracts ($\beta=0.32$; $p<.001$).[15] The high levels of sexual and drug-associated risk behaviors we found in the NHBS-HET2 population suggest that, once established, HIV could be transmitted efficiently in the local heterosexual population. The NHBS-HET surveys thus provide a means of monitoring trends in behavior and HIV prevalence in a population with potential to become a significant public health concern.

- *Contributed by Hanne Thiede, Richard Burt and Nadine Snyder*

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Summary of Data Collected for the 2011 Pride HIV Prevention Survey

Public Health – Seattle & King County (PHSKC) developed the Pride HIV Prevention Survey as a way to monitor behaviors among those most at risk for acquiring human immunodeficiency virus (HIV) infections in King County—men who have sex with men (MSM). In King County, 83% of people recently diagnosed with HIV were MSM including MSM who have injected drugs (MSM/IDU). This Pride survey started in 2009 and provides King County public health practitioners and planners with an opportunity to ask a set of core questions as well as supplemental questions that address topics of particular interest to the local community. The Pride event is an annual Gay pride festival which draws thousands of participants and includes a parade and other events. This year we included additional questions about the primary HIV infection and syphilis awareness campaigns. This report will focus on data from 2011 and make comparisons to the 2009 and 2010 surveys.

In June 2011, 15 interviewers intercepted male bystanders downtown Seattle at the Pride event and asked them to screen for participation in a brief survey. Those who identified as male and had ever had sex with another male were invited to complete a 10-minute face-to-face survey. Participants received a $5 Tully's Coffee gift card in exchange for their time.

Sociodemographic Characteristics

Three hundred and forty-six men participated in the 2011 Pride HIV Prevention Survey (**Table 1)**. The majority (85%) of men interviewed at Pride identified as gay. An additional 8% identified as straight, 5% as bisexual and 3% as "other". The participants were predominantly White (78%), 11% Hispanic, 7% Black, 5% Asian, 5% Native American and 9% other race. Over half of the men (55%) surveyed were under the age of 40. Most of the men (80%) had at least some college education. Less than a fifth (18%) of participants reported their income was less than or equal to $15,000 in the last year; 19% earned incomes in the $15,001-$30,000 range, 24% made between $30,001 and $50,000, 24% made $50,001-$100,000, and the remaining 11% earned more than $100,000. Seventy-eight percent of men surveyed at Pride reported that they currently had health insurance.

Sexual Behaviors

Responses to questions about risk behaviors show little departure from previous years (**Table 2**). In the last 12 months, 85% of participants engaged in anal sex, but nearly half (46%) had only one anal sex partner. An additional 23% had 2-4 anal sex partners, with 16% reporting that they had 5 or more anal sex partners in the 12 months preceding data collection. Eighty-one percent of all survey respondents reported having sex exclusively with men, 6% exclusively with women, 8% with both men and women and 5% with neither men nor women. Among men who did have anal sex in the last year, 31% said that they always used a condom. Twelve percent of individuals who had unprotected anal sex did so with a person of unknown HIV status, and 8% did so with a person whose HIV status they knew differed from their own. Half of participants (50%) frequented a place where gay men socialize at least once a week.

Participants reported a moderate level of sexual behavior modification based on information about a partner's HIV status; 20% decided not to have sex based on this information, 59% always based their decisions to use or to not use condoms on a partner's HIV status, and 23% always based their decision to have only oral sex on this factor. Only 4% said that in the last 12 months a man refused to have sex with them on the basis of their HIV status. A modest number of participants (16%) had a condom with them at the event. All of the suggested locations where one might want to be able to access free condoms received widespread support from respondents (ranging from 57% supporting condoms being available at needle exchanges to 89% supporting condoms being available at gay bars).

Opinions About Sexual Behaviors

Participants appear fairly divided on the degree to which they agree with the statement "Most gay men in Seattle have unprotected anal sex with guys whose HIV status they don't know". Thirteen percent of respondents strongly agreed with this statement, 38% somewhat agreed, 27% somewhat disagreed, 10% strongly disagreed and 11% refused to answer.

Table 1: Seattle Gay Pride Survey, Sociodemographic Factors, 2009-2011

	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
Race			
White	61%	75%	78%
Hispanic	11%	13%	11%
Black	11%	5%	7%
Asian	8%	5%	5%
Native American	5%	3%	5%
Other	7%	1%	9%
Age			
≤40	51%	68%	55%
>40	49%	32%	45%
Education			
Some HS or less	3%	3%	4%
HS graduate	10%	13%	16%
Some college/AA degree	35%	34%	27%
College graduate-4 year	28%	32%	31%
More than 4 year degree	24%	19%	22%
Income			
≤ $15,000	19%	16%	18%
$15,001-$30,000	17%	21%	19%
$30,001-$50,000	26%	25%	24%
$50,001-$100,000	28%	23%	24%
≥$100,001	10%	11%	11%
Refused	NA	NA	3%
Have health insurance	80%	81%	78%

Table 2: Seattle Gay Pride Survey, Sexual Behaviors, 2009-2011

	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
Sex last 12 months			
Men	87%	85%	81%
Women	2%	4%	6%
Both	6%	4%	8%
Neither	5%	6%	5%
Number of anal sex partners last 12 months			
0	37%	29%	14%
1	41%	46%	46%
2-4	13%	12%	23%
≥5	8%	7%	16%
Missing	2%	5%	1%
Anal sex partners last 12 months-no condom			
0	37%	29%	31%
1	41%	46%	50%
2-4	13%	12%	10%
≥5	8%	7%	8%
Missing	2%	5%	1%
Unprotected sex with discordant partner last 12 months			
No	90%	82%	89%
Yes	10%	13%	8%
Don't know	0%	6%	3%
Unprotected sex with unknown HIV status person last 12 months			
No	78%	81%	85%
Yes	17%	14%	12%
Don't know	5%	5%	2%
Man decide not to have sex with you in the last 12 months after you told him your HIV status?			
No	88%	90%	93%
Yes	8%	6%	4%
Don't know	4%	4%	3%
You decide to not have sex with a man in the last 12 months after he told you his HIV status?			
No	73%	85%	77%
Yes	23%	12%	20%
Don't know	4%	3%	3%
How often make decisions about using condoms based on your partner's HIV status?			
Never	23%	22%	24%
Sometimes	6%	8%	7%
Usually	11%	13%	7%
Always	57%	51%	59%
Don't Know	3%	6%	3%
How often do you decide to only have oral sex based on your partner's HIV status?			
Never	33%	36%	45%
Sometimes	16%	14%	15%
Usually	9%	5%	7%
Always	30%	23%	23%
Don't know	12%	21%	11%

Table 2 (continued): Seattle Gay Pride Survey, Sexual Behaviors, 2009-2011

	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
Are you carrying a condom now?	NA	NA	16%
Where did you get the condom?			
Pharmacies	NA	NA	15%
HIV prevention and care programs	NA	NA	8%
Gay Bars	NA	NA	10%
Bathhouses/Sex clubs	NA	NA	0%
Street and bar outreach	NA	NA	10%
Needle exchanges	NA	NA	2%
STD Clinic at Harborview	NA	NA	2%
Medical clinics or medical providers' offices	NA	NA	14%
School-based clinics and teen health centers	NA	NA	4%
Drug treatment programs	NA	NA	0%
Shelters/subsidized housing programs/homeless services programs	NA	NA	2%
Health fairs/community events	NA	NA	12%
Other	NA	NA	5%
Where would you want to be able to access free condoms?			
Pharmacies	NA	NA	77%
HIV prevention and care programs	NA	NA	67%
Gay Bars	NA	NA	89%
Bathhouses/Sex clubs	NA	NA	68%
Street and bar outreach	NA	NA	62%
Needle exchanges	NA	NA	57%
STD Clinic at Harborview	NA	NA	70%
Medical clinics or medical providers' offices	NA	NA	72%
School-based clinics and teen health centers	NA	NA	67%
Drug treatment programs	NA	NA	61%
Shelters/subsidized housing programs/homeless services programs	NA	NA	61%
Health fairs/community events	NA	NA	68%
Other	NA	NA	20%
In the past 12 months, how often have you gone to a place where gay men meet or socialize?			
Didn't go	NA	NA	9%
≥Once a day	NA	NA	6%
≥Once a week	NA	NA	35%
≥Once a month	NA	NA	28%
<Once a month	NA	NA	22%

Table 3: Seattle Gay Pride Survey, Drug Use Behaviors, 2009-2011

	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
Ever IDU			
Yes	5%	7%	8%
No	95%	93%	92%
Drug Use Last 12 Months			
Meth	8%	6%	8%
Cocaine	10%	9%	10%
Crack	3%	2%	3%

Table 4: Seattle Gay Pride Survey, HIV Status and Testing, 2009-2011

	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
HIV status			
Positive	15%	12%	12%
Negative	80%	85%	88%
Don't Know	0%	2%	0%
Ever tested for HIV			
Yes	95%	91%	91%
No	5%	8%	9%
Number of HIV tests last 2 years			
0	NA	NA	15%
1	NA	14%	29%
2	NA	28%	25%
3	NA	7%	11%
4	NA	25%	11%
5	NA	26%	10%
Where did you last test for HIV?			
STD Clinic at HMC	NA	17%	12%
Gay City	NA	16%	11%
Healthcare provider	NA	43%	45%
Bathhouse or sex club	NA	2%	2%
Other	NA	18%	30%
Refused to answer	NA	4%	NA

Drug Use Behaviors

In the last 12 months, 8% of the participants had used methamphetamine, 10% had used cocaine, and 3% had used crack (**Table 3**). Eight percent of all survey respondents said that they had, at some point in their lives, injected drugs not prescribed to them by a health care provider.

HIV Testing, Status and Healthcare

Ninety-one percent of survey participants had, in their lifetimes, tested for HIV; 12% reported being HIV-positive (**Table 4**). Among those participants who tested in their lifetimes and did not self report being HIV-positive, 15% had not done so in the last 2 years, and an additional 29% had only been tested once in the last 2 years. The highest number of respondents (45%) said the location of their last HIV test was their health care provider's office.

Fifty-seven percent of HIV-positive respondents saw their healthcare provider in the one month preceding the interview, and 100% had seen their healthcare provider in the four months preceding the interview (**Table 5**). Ninety-seven percent of HIV-positive participants knew their most recent CD4 cell count. Sixty percent reported having a CD4 cell count of greater than or equal to 500 cells/µL, 17% had a count of 350-499 cells/µL, 10% reported a CD4 cell count between 200 cells/µL and 349 cells/µL, and the remaining 10% had counts below 200 cells/µL. Seventy-three percent of HIV-positive participants said they had undetectable viral loads, and 78% were taking antiretroviral medicines to treat their HIV infections.

Table 5: Seattle Gay Pride Survey, Healthcare for HIV-Positive Participants, 2009-2011

	Pride 2009	Pride 2010	Pride 2011
Positives	**N=26**	**N=39**	**N=37**
Last saw healthcare provider (months ago)			
0	15%	8%	14%
1	27%	32%	43%
2-3	39%	43%	24%
≥4	15%	13%	19%
Missing	4%	4%	0%
Most recent CD4			
≤199	8%	3%	10%
200-349	4%	5%	10%
350-499	19%	15%	17%
≥500	50%	36%	60%
Don't know	19%	38%	3%
Undetectable Viral Load			
Yes	76%	61%	73%
No	20%	22%	22%
Don't know	4%	17%	5%
Currently taking ARV			
Yes	76%	73%	78%
No	24%	24%	22%
Don't know	0%	3%	0%

Exposure to the Primary HIV Infection Awareness Campaign and the Syphilis Education campaign

A few survey questions were designed to assess Public Health's success in disseminating information about syphilis and primary HIV infection (R U 2 Hot campaign). A larger proportion of respondents (39%) reported having seen Public Health's syphilis campaign as compared to the number who had seen the R U 2 Hot campaign (19%). However, among those who saw the syphilis campaign, a larger proportion didn't know any symptoms of syphilis (48%) as compared to the number of those familiar with the R U 2 Hot campaign who didn't know any symptoms of a primary HIV infection (33%) (**Table 6**). In both cases, those who saw the campaign exhibited a slight increase in knowledge of the symptoms of the disease, as compared to those who never saw the campaign (a 4% increase for knowledge of primary HIV symptoms; a 6% increase for knowledge of syphilis symptoms). In the case of syphilis, the most widely recognized symptoms for those who had seen the campaign included body rash (25%), dementia/memory loss (15%) and fever (15%), with the lowest recognized symptoms being hair loss (2%), hearing loss (3%) and weight loss (4%). With respect to the R U 2 Hot campaign, flu-like illness (49% for those who had seen the campaign) and fever (41%) were the most frequently identified symptoms of a primary HIV infection, while dizziness (8%) and oral/genital ulcers (10%) were the least frequently identified.

As a particular focus of this year's Pride prevention survey, investigators wanted to know more about the current syphilis outbreak among residents of King County. Three survey questions touched on this issue: the previously mentioned question about awareness of Public Health's syphilis campaign, one that asked about STD testing behaviors and a third that asked about STD diagnoses.

Table 6: Symptoms of primary HIV infection

Symptoms of primary HIV infection	Among those who did see the primary HIV infection campaign: N=64	Among those who did not seen the primary HIV campaign: N=265
Diarrhea/loose stools	17%	10%
Dizziness	8%	6%
Fatigue/weak/tired/loss of energy	36%	22%
Fever	41%	26%
Flu-like illness	49%	31%
Headache/eye pain	13%	5%
Muscle/body aches	17%	8%
Nausea/vomiting/loss of appetite/weight loss	23%	18%
Night sweats	30%	14%
Oral/genital sores/ulcers	10%	8%
Rash	13%	7%
Sore throat	17%	9%
Swollen lymph nodes	28%	18%
Don't know any symptoms	33%	37%
Symptoms of syphilis infection	**Among those who did see the syphilis campaign: N=133**	**Among those who did not seen the syphilis campaign: N=203**
Body rash	25%	15%
Dementia/memory problems	15%	5%
Fatigue/tired	11%	4%
Fever	15%	11%
Genital/anal sore/ulcer	13%	19%
Hair loss/alopecia	2%	1%
Headache	9%	4%
Hearing loss/deafness	3%	2%
Mouth sore/ulcer	11%	11%
Nerve problems/paralysis	13%	2%
Swollen lymph nodes/glands	9%	9%
Vision loss/blindness	11%	5%
Weight loss	4%	3%
Don't know any symptoms	48%	54%

Table 7: Sexually transmitted infections

Sexually Transmitted Infections, Pride 2011	
Been tested for:	
Syphilis	47%
Gonorrhea	45%
Chlamydia	44%
None	51%
Been told you have:	
Syphilis	1%
Gonorrhea	4%
Chlamydia	2%
None	94%

Table 8: Pre-exposure Prophylaxis

HIV Negatives	Pride 2009 N=137	Pride 2010 N=272	Pride 2011 N=275
Have you ever heard of gay men taking HIV medicines to prevent themselves from getting HIV?			
Yes	26%	23%	26%
No	74%	75%	73%
Don't know	0%	2%	1%
Have you ever taken HIV medicines to prevent yourself from getting HIV?			
Yes	2%	1%	1%
No	98%	99%	99%
If taking these medications helped prevent HIV, would you take them every day?			
Yes	42%	42%	41%
No	43%	33%	42%
Don't know	15%	13%	19%
People on HIV meds are less likely to transmit HIV			
Yes among all	20%	19%	27%
Yes among positives	35%	39%	38%
Yes among negatives	15%	17%	26%
No	57%	55%	50%
Don't know	23%	24%	23%

Nearly half of all survey respondents had tested for syphilis (47%), gonorrhea (45%) or Chlamydia (44%) in the previous 12 months (**Table 7**). Ninety-four percent said that they had not, in the last 12 months, received a positive test result from a doctor, nurse or other health care worker for any of these diseases. One percent said that they had tested positive for syphilis in the past year, 4% had tested positive for gonorrhea and 2% tested positive for Chlamydia.

Awareness of HIV Pre-exposure Prophylaxis

Importantly, the 2011 data for awareness about pre-exposure prophylaxis (PrEP) suggests that the number (26%) (**Table 8**) of HIV-negative individuals who have ever heard of gay men taking medicines before sex to prevent themselves from acquiring an HIV infection remained virtually unchanged when compared to data on the same question from Pride 2010 (23%) and Pride 2009 (26%). Similarly, there was no trend in the number of HIV-negative individuals who have ever used PrEP (1% in 2011; 1% in 2010; 2% in 2009) nor for the number who would be willing to take HIV medications every day if shown that they prevent an HIV infection (41% in 2011; 42% in 2010; 42% in 2009). However, the percentage of participants who believed that people taking HIV medicines are less likely to transmit HIV increased to 27% in 2011 from 19%-20% in 2009-2010. These findings are interesting in light of the iPrEx results having been released in November 2010, seven months prior to Pride. IPrEx results showed that study participants who took the daily dose of oral antiretrovirals experienced an average of 43.8 percent fewer HIV infections than those who received a placebo pill.[2]

Issues Related to Stigma and Discrimination

Questions intended to assess perceived stigma were: "How accepting are most people in your community of gay and bisexual people?" and "How comfortable or uncomfortable do you feel about your sexual identity?" (**Table 9**). With respect to the former question, 61% felt that most people in their communities are very accepting and only 2% felt that most people in their communities are not at all accepting. In response to the second question about sexual identity, 83% said they felt very comfortable with their sexual identities and 5% felt very uncomfortable. Responses to both questions indicate a decrease in perceived stigma among participants, as compared to 2010 Pride results.

The Pride survey provides local prevention planners with annual information to monitor HIV-related risk behaviors among MSM in King County. This survey is a convenience sample and is not necessarily representative of all MSM in the Seattle area, however, it does provide a large sample size and consecutive years of data in which to monitor trends and explore emerging issues.

- *Contributed by Melissa Robe, Angie Ulrich and Elizabeth Barash*

Table 9: Social identity and stigma

Social identity and stigma	Pride 2009 N=172	Pride 2010 N=349	Pride 2011 N=346
Sexual identity			
Gay	87%	88%	85%
Straight	2%	5%	8%
Bisexual	11%	4%	5%
Other	NA	NA	3%
How accepting are most people in your community of gay/bisexual?			
Not at all accepting	NA	2%	2%
Somewhat not accepting	NA	3%	4%
Accepting	NA	26%	1%
Somewhat accepting	NA	17%	30%
Very accepting	NA	50%	61%
How comfortable do you feel about your sexuality?			
Very uncomfortable	NA	19%	5%
Somewhat uncomfortable	NA	2%	1%
Neither comfortable or uncomfortable	NA	2%	1%
Somewhat comfortable	NA	9%	9%
Very comfortable	NA	67%	83%
Most gay men in Seattle have UAI w/unknown status			
Strongly agree	16%	11%	13%
Somewhat agree	45%	39%	38%
Somewhat disagree	32%	30%	27%
Strongly disagree	8%	11%	10%
Refused to answer	0%	10%	11%

[1] HIV/AIDS Epidemiology Unit, Public Health—Seattle & King County and the Infectious Disease and Reproductive Health Assessment Unit, Washington State Department of Health. HIV/AIDS Epidemiology Report, 2nd Half 2010: Volume 77.

[2] Grant, RM, et al. Pre-exposure chemoprphylaxis for HIV prevention in men who have sex with men. N Engl J Med. 2010 Dec 30;363(27):2587-99. Epub 2010 Nov 23.

Viral Load Suppression and Unmet Needs among Participants in the Medical Monitoring Project, 2009

Background

The Medical Monitoring Project (MMP) is a surveillance project designed to learn about the experiences and needs of people who are receiving care for HIV. The federal Centers for Disease Control and Prevention (CDC) funds the project and partners with 23 city, county and state health departments across the country to conduct it. Washington State has been participating with MMP since its inception in 2005. The surveillance project uses a three-stage approach to develop a representative sample of approximately 400 individuals in Washington State who received medical care at any of about 20 selected medical facilities in a specific four-month period. After the sample is chosen, project staff work with the patients' health care facilities to recruit patients for interviews and review their medical records. The interview questionnaire asks for a variety of information related to a patient's demographics, access to care and prevention services, use of HIV antiretrovirals and health- and risk-related behavioral information. The purpose of the medical record review is to obtain important clinical information related to a patient's health status and HIV-related care.

Methods

The analyses presented in this article include data primarily drawn from patient interviews with supplementary laboratory data from medical record reviews. We looked at descriptive characteristics (patient demographics, psychosocial factors, unmet needs, antiretroviral drug use and adherence) of participating patients and compared these characteristics with suppressed viral load or high CD4 as evidenced by chart abstractions. For the most part we looked at a simple dichotomous outcome of suppressed viral load defined as an undetectable or very low result (200 or fewer copies per milliliter). For individuals with no viral load test or unknown viral load results, we included a high CD4 count (above 500 per µL) with the suppressed group, as many individuals in this CD4 range would not yet have started on antiretrovirals and would be expected to fare as well clinically (or even better) than individuals with suppressed viral load and lower CD4 counts.

Results

During the 2009 MMP cycle, project staff interviewed 180, or 45% of the total 400 sampled patients. Of the 20 sampled and eligible facilities, we collected data from 19 (95%). We also completed 252 (63%) medical record abstractions. The medical records of 156 of the 180 patients interviewed included HIV viral load data within the previous year. Of the 24 that did not include HIV viral load data, 21 included evidence of care by inclusion of CD4 data. There were three patients without HIV viral load or CD4 data. Demographic characteristics of participants are presented in **Table 1**.

Substance use was common. This included tobacco use (56% smoked cigarettes daily), alcohol (14% drank daily), and illicit drug use (42% including marijuana, methamphetamines, injection, and other drugs).

Twenty-five percent of participants reported never missing any doses of their antiretroviral medications, 14% last missed a dose more than three months ago, 16% missed a dose 1–3 months ago, and approximately 30% report missing one or more doses of antiretrovirals within the past month. The most common reasons for missing medications include forgetting to take them (19%) and changes in daily routine, including travel (19%). Missing antiretrovirals within the past month was negatively associated with viral load suppression.

Most participants (90%) were receiving antiviral therapies, and of these, most (77%) had viral suppression, see **Figure 1**.

While all participants were receiving medical care, about half reported having at least one unmet need for some sort of service. Fifteen percent reported having at least three unmet needs. Dental, peer support and transportation were the three most common unmet needs (**Table 2**).

Table 1: Patient characteristics and suppressed viral load, Medical Monitoring Project, Washington State, 2009, N=180

Characteristic		N[1]	Percent
Sex	Male	147	82%
	Female	33	18%
Sexual orientation	Gay/lesbian	100	61%
	Straight	49	27%
	Bisexual	15	8%
	Other	6	3%
Age in years	< 18	2	1%
	18-24	24	13%
	25-34	49	27%
	35-54	68	38%
	55+	37	21%
Education	Less than high school	20	11%
	High school/GED	31	19%
	Some college	73	41%
	Bachelor's degree	31	17%
	Any post-graduate	22	12%
Income (% of federal poverty level)	≤ 100%	75	42%
	101-133%	23	13%
	134-150%	2	1%
	151-185%	15	8%
	201-250	22	12%
	>250%	43	24%
Race/ethnicity	Am. Indian / AK native	3	2%
	Asian	1	1%
	Black	20	11%
	Hispanic (any race)	22	12%
	Pacific Islander	1	1%
	White	116	64%
	Multiracial	12	7%
	Unknown	5	3%

[1]Categories may not add up to total because of missing data for individual variables.

Figure 1: Viral suppression and antiretroviral use, Medical Monitoring Project, Washington State, 2009

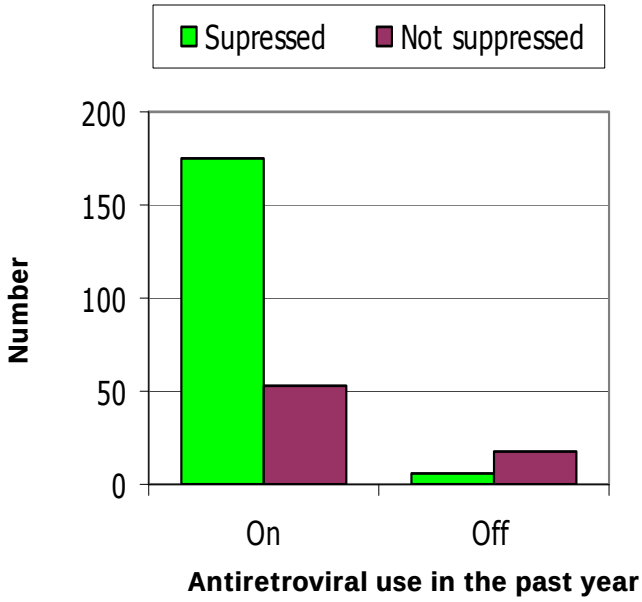

Table 2: Unmet Needs for Services, Medical Monitoring Project, Washington State, 2009

Service	N	%
Dental	33	18%
Peer support	22	12%
Transportation	19	11%
Housing	16	9%
SSDI (Supplemental Security Disability Insurance)	14	8%
Case management	13	7%
Mental health	12	7%
Substance abuse counseling	11	6%
AIDS Drug Assistance Program (ADAP)	10	6%
Meals	10	6%
Medication reminders	6	3%
Number of unmet services		
None	91	51%
One	35	19%
Two	27	15%
Three	18	10%
Four or more	9	5%

Five or fewer individuals also stated needs for home health services, domestic violence services, counseling, interpreter, and childcare services. As expected, poverty was associated with care gaps, with 67% of those at or below the federal poverty level reporting one or more gap versus only 37% of individuals with higher incomes reporting any service gaps. Individuals reporting three or more service gaps were far less likely to achieve viral suppression (52%) relative to those with one or two gaps (77% suppressed) or no service gaps (74%) suppressed.

Discussion

MMP is a vitally important project to describe and monitor individuals with HIV and HIV care locally and nationally. Locally we find that among MMP participants, most are receiving appropriate medical care and are virologically-suppressed. Viral suppression is strongly associated with antiretroviral use. It is concerning that the benefit of viral suppression is not as prevalent among individuals reporting multiple gaps in other (non-medical) HIV care services.

However, MMP faces multiple challenges. Foremost is a low participation rate which places representativeness of the data in to question. Compounding low participation of patients is provider refusal. Although our provider refusal rate is low (typically less than 10% each year), each non-participating facility also decreases the representativeness of the sample. Further, engagement of medical providers in patient recruitment is key to the success of the project, as recruitment by a physician known to a patient is more likely to be successful than recruitment by an unknown person from the health department. Facilities and providers also need to provide access to medical records.

In the future, MMP participation may be improved by the use of telephone interviews. Other methods to make this project more representative may include streamlined medical record reviews (to complete briefer reviews on a larger number of people without additional resources), and sampling from core HIV/AIDS surveillance (instead of asking providers for a list of patients seen the first four months of the year).

- *Contributed by Tom Jaenicke, Elizabeth Barash, and Susan Buskin*

Vitamin D, Brittle Bones and HIV: What to Do?

Vitamin D has been in the news a lot lately, not just because of the lack of sunshine in Seattle. Many diseases have been associated recently with low Vitamin D levels. Vitamin D and calcium are necessary to maintain strong bones. The more people look, the more they are finding that many people with HIV have low levels of Vitamin D. Also, it has been shown that poor outcomes of HIV infection are also associated with low levels of Vitamin D.

Vitamin D is made by conversion of precursors in the skin in reaction to sun exposure and subsequent conversions in the liver and the kidney to the active form, 1,25-dihydroxyvitamin D (1,25(OH)2D), also known as calcitriol. Vitamin D is contained naturally in very few foods, so milk is fortified with vitamin D. Vitamin D is necessary to maintain normal blood calcium levels and bone strength. Without sufficient vitamin D, bones can become thin and brittle. Vitamin D has other roles in the body, including modulation of cell growth, neuromuscular and immune function, and reduction of inflammation (a very hot topic in the HIV field these days). Many genes encoding proteins that regulate cell proliferation, differentiation, and cell death are modulated in part by vitamin D. Many cells have vitamin D receptors, and some convert 25(OH)D (25-hydroxyvitamin D) to 1,25(OH)2D.

People in northern climates have lower levels of vitamin D, and their levels are even lower in winter than in summer. A simple blood test can measure your vitamin D level. Associations have been suggested with low vitamin D levels and many diseases, including: breast cancer; colorectal cancer/colon polyps; prostate cancer; cardiovascular diseases and hypertension; diabetes (type 2) and metabolic syndrome (obesity); abnormal immune responses and associated illnesses such as asthma, diabetes (type 1), inflammatory bowel and Crohn's disease, multiple sclerosis, rheumatoid arthritis, and systemic lupus; infectious diseases including tuberculosis and influenza/upper respiratory infections; and neuropsychological functioning, autism, cognitive function and depression.

This past year the Institute of Medicine conducted an expert review and concluded that at this time, the scientific data available indicate a key role for calcium and vitamin D in skeletal health and provide a sound basis for dietary reference intakes (DRI). The data do not, however, provide compelling evidence that either nutrient is causally related to extra-skeletal health outcomes or that intake greater than those established in the DRI process have benefits for health. Further research will assist greatly in clarifying DRI for vitamin D and calcium in the future.

For people with HIV, however, there is significant data showing that lower levels of vitamin D are associated with higher risk of mortality, AIDS events, and adult onset diabetes. However, it has not been shown that there is a cause and effect relationship, such that supplementing vitamin D will offset these differences. This is a very active area of research. Certainly measuring vitamin D levels in all people with HIV and supplementing it in people with low levels is advisable.

Both HIV and HIV treatments are associated with decreased bone density, or osteopenia, the precursor to more severe bone mineral loss, or osteoporosis. Most people starting HIV treatment lose bone mineral density (BMD) during the first year of treatment. While advanced osteoporosis can be diagnosed on X-rays, the most common method for measuring BMD is by Dual Energy X-ray Absorptiometry, known as a DEXA scan. This scan uses low-energy x-rays to assess calcium levels in bone. The results are measured as a "score" and are compared to those of healthy individuals. The lower the score, or T score, the lower the BMD. The World Health Organization criteria for bone loss are: -1 to -2.5 T score, osteopenia; below -2.5 T score, osteoporosis; and below -2.5 T score with fragility fracture, severe osteoporosis. DEXA scan results are even more complicated since individual scores are given for the lumbar spine, hip and femoral neck regions.

The AIDS Clinical Trials Group (ACTG) has previously shown that drugs which increase BMD, such as alendronate, can be used safely and are effective in people with HIV infection. The ACTG is conducting a new study in the setting of highly active antiretroviral therapy (HAART) initiation. The purpose of the study is to see whether participants taking efavirenz (EFV)/ emtricitabine (FTC)/tenofovir (TDF) (Atripla®) and daily supplementation of 4000 IU oral vitamin D3 and 1000 mg oral calcium carbonate will have less bone loss at the hip (as measured by DEXA scan) at 48 weeks than subjects taking EFV/FTC/TDF plus vitamin D placebo

and calcium placebo. The study will enroll and follow 168 people for 48 weeks.

The current standard of care for people with HIV does not include routine DEXA scans, but this study and others will provide valuable information on both the role of vitamin D and calcium supplementation and DEXA scans in people with HIV. This is an important area of research as HIV seems to accelerate aging and one of the features of aging includes loss of BMD. A group from the VA recently reported an increased risk of non-traumatic fractures in people with HIV. Also, the relationship of chronic inflammation, which seems to be the cause of significant morbidity in people with long-term HIV suppression on HAART, and the possible interaction of vitamin D is another important area of ongoing investigation.

- *Contributed by Jeffrey Schouten, MD*

[1]http://ods.od.nih.gov/factsheets/vitamind/
[2]Dietary Reference Intakes for Vitamin D and Calcium. IOM 2011

University of Washington AIDS Clinical Trials Unit
325 9th Avenue, 2-West Clinic; Box 359929
Seattle, WA 98104
206-731-3184 (voice); 206-744-3483 (fax); www.uwactu.org

The following is a list of studies open for enrollment. Screening, lab tests and clinical monitoring that are part of a study are provided free of charge for participants. Enrollment in a study at the ACTU does not replace the role of a primary care provider. The ACTU coordinates efforts with each participant's primary care provider.

Providers and potential enrollees can call the ACTU at (206) 744-3184 and ask for Eric Helgeson, RN for appointments or additional information.

July 2011

Antiretroviral Studies

Study 5280

Eligibility	Study Purpose	Study Drug or Treatment
• HIV-positive and 18 years or older • Have never taken anti-HIV medication • Have an HIV viral load greater than 1000 copies/ml • HIV genotype shows no evidence of resistance to Atripla • Are not taking more than 800 IU/day of Vitamin D • Are not using calcium supplement greater than 500 mg/day • Are not pregnant, breast feeding, or planning pregnancy • Do not have very low levels of Vitamin D or a history of osteoporosis (weak bones)	To evaluate if high-dose vitamin D and calcium supplements can decrease bone loss associated with starting HIV medications. **Metabolic Substudy:** Includes tests to investigate how the study drugs affect fat deposits in blood vessels and the abdomen. These tests include: computer tomography (CT) scans, ultrasounds of the carotid arteries (CIMT), tests of an artery in the arm (FMD), and dual x-ray absorptiometry (DEXA).	**Medications While on Study:** • Atripla® • (efavirenz/emtricitabine/tenofovir) • Vitamin D3 or placebo (dummy pill) • Calcium carbonate or placebo o Volunteers will be randomized to take Vitamin D3 and calcium carbonate or placebos. o **All subjects will receive Atripla**. **Length of Study**: About 48 weeks **Schedule of Study Visits**: Screening, entry and weeks 12, 24, 36, and 48. **Reimbursement:** Clinical exams, study medications, and lab tests are provided at no extra cost. You will receive $20 per visit starting at entry. DEXA $15 per test at entry and week 48.

Rescue Studies (none currently available)

Eligibility	Study Purpose	Study Drug or Treatment

Complications of HIV and Other Conditions

Study 5275

Eligibility	Study Purpose	Study Drug or Treatment
• HIV positive people age 18 or older • Currently on a protease inhibitor as part of your anti-retroviral therapy for at least 6 months and no plans to change medications • Undetectable HIV viral load • Not on any cholesterol lowering medication • LDL greater than 70 and less than 130mg/dl • Women should not be pregnant, breast feeding, or planning pregnancy • No active hepatitis B or C	To see if treatment with atorvastatin (Lipitor®) is effective at reducing markers of inflammation in the blood that may contribute to heart disease and cancer in HIV infected people.	**Medications while on study:** Atorvastatin and placebo will be provided while on this study. Subjects will take each drug for 20 weeks and no drugs for 4 weeks in between. **Length of study:** 48 weeks **Schedule of study visits:** Screening, pre-entry, entry, 2, 4, 8, 12, 20, 21, 24, 26, 28, 32, 36, 44, 45, and 48 weeks **Reimbursement:** Clinical exams, atorvastatin/placebo, and lab tests are provided at no cost. $20 per visit starting at entry.

HIV and Women Studies		
Study 5283		
Eligibility	Study Purpose	Study Drug or Treatment
• Are an HIV-1 positive woman 18 years of age or older • Are taking Kaletra as part of your anti-retroviral therapy • Are not planning to change anti-retroviral therapy • Have an HIV-1 viral load under 400 copiers/mL • Have CD4+ T cells greater than 200 • Are premenopausal with normal ovarian function • Have had a Pap smear in the last year • Have not received Depoprovera in the last 6 months and no other hormonal therapy for 1 month • Are willing to abstain from grapefruit products • Are not pregnant, breast-feeding, or planning pregnancy • Have not had a blood clot in your legs or lungs	To see if the level of Depo-Provera in the blood is affected by Kaletra (lopinavir/ritonavir [LPV/r]). It is not known whether taking Depo-Provera together with Kaletra changed the amount of Kaletra in the blood, so this study will also look at the levels of HIV and Kaletra before and after a shot of Depo-Provera is given.	**Medications while on study:** Depo-Provera at entry visit with the option of a second dose at week 12 **Length of Study:** About 12 weeks **Schedule of Study Visits:** Screening, entry, and weeks 2, 4, 6, 8, and 12. These study visits will last about 1 hour except entry and week 4 visits which will last between 11-12 hours. **Reimbursement:** Clinical exams, Depo-Provera injections, and lab tests are provided at no cost. Participants receive $100 for completion of the entry and week 4 visits and $20 for all other on-study visits.

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