

# HIV Infection in the Women's Jail, Orange County, California, 1985 through 1991

## ABSTRACT

The incidence and prevalence of human immunodeficiency virus (HIV) infection among injection drug users, prostitutes, and other women seeking confidential testing in the Orange County Women's Jail were assessed from 1985 to 1991. A total of 4616 voluntary tests were completed on 3051 women, and 865 women were tested repeatedly. Eighty-two women tested positively, a ratio of 1.8 positives per 100 tests or 2.7% of all persons tested. Cumulative HIV prevalence increased from 2.5% to 2.7% between 1985 and 1991, increased by age, and showed racial differences. Of women with multiple tests, 29 seroconverted. Incidence declined from 5.7 to 1.4 cases per 100 person-years of observation between 1985 and 1991. The overall rate of seroconversion was 1.6 per 100 person-years of observation. (*Am J Public Health*. 1993;83:1454-1456)

George A. Gellert, MD, MPH, MPA, Roberta M. Maxwell, PhD, Kathleen V. Higgins, BA, Thomas Pendergast, MD, MPH, and Norma Wilker, AA, LVN

### Introduction

Between 1983, when cases of the acquired immunodeficiency syndrome (AIDS) were first reported among incarcerated populations, and late 1988, more than 3000 prison cases were reported.<sup>1-3</sup> AIDS is rapidly becoming a leading cause of death in US prisons,<sup>4</sup> where 60% of cases are attributable to injection drug use prior to incarceration.<sup>3,5</sup> Seroprevalence studies of US prisoners have demonstrated rates of human immunodeficiency virus (HIV) infection ranging from 0% to 17% in 17 states.<sup>3,6,7</sup> and a rate of 18.5% in New York City.<sup>8,9</sup>

The number of incarcerated women in the United States increased by 53% between 1983 and 1987.<sup>10</sup> Female prisoners are at risk for HIV infection from prostitution as well as from injection drug use. This study evaluated HIV seroprevalence in the Orange County, California, Women's Jail over the 7-year period from 1985 through 1991. Temporal trends and the incidence of HIV infection were assessed from longitudinal follow-up of inmates over multiple incarcerations, and repeated HIV antibody tests were administered during this period.

### Methods

The Orange County jail processes over 82 000 bookings per year at five intake facilities; 63% of inmates are between 18 and 30 years old, 60% are from minority groups, 8% to 10% are women, and 75% are recidivists. The mean length of stay is 4 days, and the mean daily inmate census is 4340. The jail population differs from the prison inmate population in that there are shorter incarcerations for less serious offenses. Most inmates are local residents of Orange and Los Angeles counties.

Tests were administered to inmates of the Orange County Women's Jail who had been charged with prostitution, illegal injection drug use, or related offenses (such as theft) and those who requested testing. All testing was voluntary and was provided as a service. Risk factors for

HIV infection were identified for 59% (1792) of tested inmates; of those, 63% reported a history of injection drug use. Participants were encouraged to seek testing at each booking, so serial tests were possible. A total of 3015 women were tested for HIV antibody from 1985 to 1991 (yielding 4616 tests) (Table 1). In 1990, the percentage of women consenting to be tested among all offered testing was 95.4%.

In the testing program, a nurse interviews inmates regarding risk, counsels risk reduction, and arranges for medical follow-up as needed. Infected women are referred for medical evaluation, early intervention, and other services such as drug treatment. Data collection in the women's jail began with HIV test availability (March 1985). Except for an 8-month hiatus, data collection has been continuous. Data were available on inmate identity, age, race/ethnicity, and HIV risk factors (injection drug use, transfusion recipient, high risk partner, heterosexual with multiple partners, contact with a person known to be HIV positive). Serum samples were analyzed by enzyme-linked immunosorbent assay (ELISA) (to detect antibodies to HIV) and Western blot or indirect fluorescent antibody (IFA) (to confirm positive tests). Seroprevalence data by risk factor category are available for comparison from two other Orange County testing sites: alternative test sites (voluntary, anonymous testing at no cost) and drug treatment clinics (confidential testing at no cost).

Cumulative prevalence by year (the ratio of the number of women who tested positive to the total number of women tested to date) and point prevalence averaged over the year (the ratio of the number of women who tested positive in a given

At the time of the study, the authors were with the Orange County Health Care Agency, Santa Ana, Calif.

Requests for reprints should be sent to George A. Gellert, MD, MPH, MPA, 3815 N Black Canyon Hwy, Phoenix, AZ 85015.

This paper was accepted January 27, 1993.

TABLE 1—HIV Test Results by Year: Orange County Women's Jail

Year	No. of Women Tested	No. of Positive Tests	Point Prevalence, % <sup>a</sup> (95% CI)	No. of Tests Performed	Positive Tests, % (95% CI)	No. of Conversions to HIV Positive	Incidence, % (95% CI)	No. of Women Tested Repeatedly	Positive Tests, % (95% CI)	Cumulative		
										No. of Women Tested	No. of Positive Tests	Prevalence, % (95% CI)
1985 <sup>b</sup>	489	12	2.5 (1.1, 3.8)	552	2.2 (1.0, 3.4)	0	0.0 ...	53	0.0 ...	489	12	2.5 (1.1, 3.8)
1986	563	15	2.7 (1.3, 4.0)	628	2.4 (1.2, 3.6)	8	5.7 (1.8, 9.5)	166	4.8 (1.6, 8.1)	917	27	2.9 (1.8, 4.0)
1987	571	16	2.8 (1.4, 4.2)	641	2.5 (1.3, 3.7)	6	2.6 (0.5, 4.6)	210	2.9 (0.6, 5.1)	1300	43	3.3 (2.3, 4.3)
1988	624	10	1.6 (0.6, 2.6)	704	1.4 (0.6, 2.3)	4	1.4 (0.0, 2.7)	236	1.7 (0.0, 3.3)	1722	53	3.1 (2.3, 3.9)
1989	487	2	0.4 (0.0, 1.0)	511	0.4 (0.0, 0.9)	0	0.0 ...	163	0.0 ...	2057	55	2.7 (2.0, 3.4)
1990	596	13	2.2 (1.0, 3.4)	664	2.0 (0.9, 3.0)	4	1.1 (0.0, 2.2)	216	1.9 (0.1, 3.6)	2461	68	2.8 (2.1, 3.4)
1991	801	14	1.7 (0.8, 2.7)	916	1.5 (0.7, 2.3)	7	1.4 (0.4, 2.4)	304	2.3 (0.6, 4.0)	3015	82	2.7 (2.1, 3.3)
Total	3015	82	2.7 (2.1, 3.3)	4616	1.8 (1.4, 2.2)	29	1.6 (1.3, 1.9)	865	3.4 (2.2, 4.6)	...	...	...

<sup>a</sup>Averaged over the year.

<sup>b</sup>March through December.

year to the number of women tested that year) are provided. Dates were available for each HIV test conducted, and the number of days between tests and from the first to the last test was calculated. This allowed determination of the incidence of new HIV infection (the ratio of the number of women testing positive in a given year, having previously tested negative, to the number of person-years of observation from the first negative test to the latest test) among inmates with two or more tests.

## Results

Table 1 and Figure 1 summarize the cumulative prevalence, point prevalence averaged over the year, and incidence of HIV infection by year among inmates consenting to be tested. Eighty-two cases of HIV infection had been identified by the end of 1991, a ratio of 1.8 seropositives per 100 tests (95% confidence interval [CI] = 1.4, 2.2), or 2.7% (95% CI = 2.1%, 3.3%) of all women tested. The prevalence of HIV infection increased 0.2% between 1985 and 1991, a statistically nonsignificant difference ( $z = 0.19$ ,  $P = .43$ ). Similarly, in the comparison group of female injection drug users at alternative test sites, the prevalence of HIV infection rose from 2.1% in 1985 to 2.2% by 1991. Drug treatment clinic data have been available since 1988, and in this comparison group the prevalence increased from 1.3% to 1.4% between that year and 1991. The prevalences of HIV infection by age and by race/ethnicity are summarized in Tables 2 and 3, respectively. Prevalence increased with age and was higher among African Americans (race was recorded for two thirds of the sample).

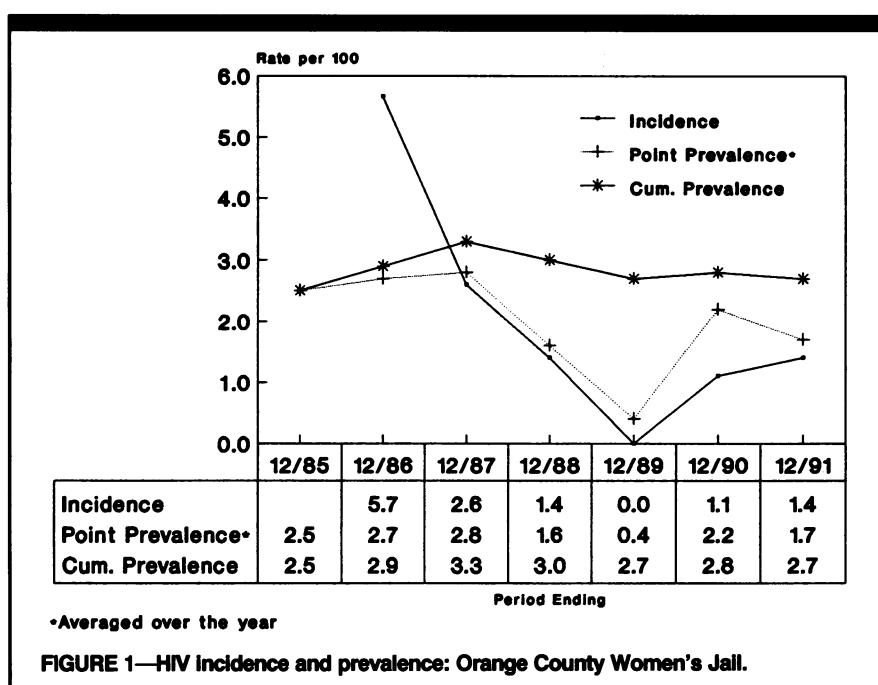


FIGURE 1—HIV incidence and prevalence: Orange County Women's Jail.

TABLE 2—HIV Positivity Rates by Age: Orange County Women's Jail

Age Category, y	No. of Women Tested	No. of Positive Tests	Positive Tests, % (95% CI)
15-19	165	0	0.0
20-24	690	16	2.3 (1.2, 3.4)
25-29	907	25	2.8 (1.7, 3.8)
30-34	659	24	3.6 (2.2, 5.1)
35-39	337	7	2.1 (0.5, 3.6)
40 and older	179	6	3.4 (0.7, 6.0)
Unknown	78	4	...
Total	3015	82	2.7 (2.1, 3.3)

Of 865 (28.4%) women with two or more tests during the study period, 29 (3.4%, 95% CI = 2.2%, 4.6%) seroconverted. Because the period of observation for individual inmates reflects the variability in time between bookings and first and

last tests, cases per 100 person-years of observation are reported. Incidence rates by year per 100 person-years of observation are shown in Figure 1. The total rate of seroconversion between 1985 and 1991 (the cumulative incidence rate divided by

TABLE 3—HIV Positivity Rates by Race/Ethnicity: Orange County Women's Jail

Race/Ethnicity	No. of Women Tested	No. of Positive Tests	Positive Tests, % (95% CI)
White	1219	38	3.1 (2.1, 4.1)
Black	193	9	4.7 (1.7, 7.6)
Hispanic	612	18	2.9 (1.6, 4.3)
Asian	5	0	0.0
Other	32	1	3.1 (0.0, 9.2)
Unknown	954	16	...
Total	3015	82	2.7 (2.1, 3.3)

the cumulative number of person-years of observation) was 1.6 (95% CI = 1.3, 1.9).

Disease outcomes in 55 women diagnosed with HIV infection were determined from Orange County HIV Registry records (27 were not listed): 48 women were living with HIV infection and 7 had died. Of the 7 deaths, 5 were related to AIDS and 2 were the result of a drug overdose. Among the women living with HIV infection, 1 had progressed to AIDS, 7 were living with AIDS-related complex, 5 had been diagnosed with persistent generalized lymphadenopathy, and 35 were asymptomatic. Among seropositives, 45 (82%) had a history of injection drug use and 47 (85%) had a history of prostitution; all had at least one of these two risk factors.

### Discussion

HIV infection exists at a low level among women inmates in the Orange County jail. Prevalence has remained stable, as observed in the Maryland state prison system.<sup>11</sup> Inmate HIV infection rates were slightly higher than those found in a Nevada prison<sup>12</sup> and higher than those of 80% of 25 prison systems reporting to the Department of Justice.<sup>3</sup> The similar prevalence of infection among inmate injection drug users and those at two other county sites suggests that HIV risk in female inmates resulting from extensive heterosexual activity does not add greatly to the risk expected from injection drug use alone. The transient, episodic nature of jail incarceration supports the idea that this seroprevalence is more reflective of HIV infection among

local or community female injection drug users than are rates seen in prison populations.

The declining incidence rate may be partly attributable to the effectiveness of the jail HIV intervention and education program. A cause for concern is the increase observed in 1990 and 1991. A stable prevalence in female inmates over 5 years and a declining incidence among those tested repeatedly suggest that even if learning occurs over time regarding risk aversion, at least one subgroup continues to acquire new infection. The voluntary sample tested may reflect early interest in repeated testing among inmates most concerned about infection. The high degree of inmate test compliance suggests that this sample probably represents a maximum estimate of HIV prevalence in the jail population.

Inmate HIV testing should continue to be followed up by appropriate discharge planning and referrals for further medical care upon release. Extensive use of injection drugs warrants a continued focus on jails for drug treatment and prevention. As is the case in the general population, inmate HIV prevention will depend on voluntary behavior change. If voluntary risk reduction among inmates is to be effective, voluntary rather than mandatory testing may be preferable because it promotes acceptance of risk reduction counseling.<sup>13</sup> □

### Acknowledgments

We wish to acknowledge the efforts of the following staff associated with Orange County Correctional Medical Services: P. Cohn, B.

Allen, V. Galvan, N. Sanders, B. Saldivar, T. Day, P. Hartnett, M. Moldstad, L. Morales, N. Perry, H. Richards, N. Sarin, B. Smith, C. Hatch, and E. Williams, MD.

### References

- Hanrahan JP, Wormser GP, Maguire GP, DeLorenzo LJ, Gavis G. Opportunistic infections in prisoners. *N Engl J Med*. 1982; 307:498. Letter.
- Wormser GP, Krupp LB, Hanrahan JP, Gavis G, Spira TJ, Cunningham RS. Acquired immunodeficiency syndrome in male prisoners. *Ann Intern Med*. 1983;98:297-303.
- Hammett TM. *1988 Update: AIDS in Correctional Facilities*. Washington, DC: US Dept. of Justice; 1989.
- Acquired Immunodeficiency Syndrome: A Demographic Profile of New York State; Mortalities 1982-1985*. Albany, NY: New York State Commission of Corrections; 1986.
- AIDS in New York State through 1988*. Albany, NY: New York State Department of Health; 1989:30.
- Vlahov D, Brewer F, Taylor E, et al. Infrequent transmission of HIV-1 infection in Maryland prisons. In: *IV International Conference on Acquired Immunodeficiency Syndrome*. Stockholm, Sweden: Swedish Ministry of Health and Social Affairs; 1988;1:312. Abstract.
- Glass GE, Hausler WJ, Loeffelholz PL, Yesalis CE III. Seroprevalence of HIV antibody among individuals entering the Iowa prison system. *Am J Public Health*. 1988; 78:447-449.
- Weisfuse IB, Greenberg BL, Back SD, et al. HIV-1 infection among New York City inmates. *AIDS*. 1991;5:1133-1138.
- Smith PF, Miki J, Truman BI, et al. HIV infection among women entering the New York State correctional system. *Am J Public Health*. 1991;81(suppl):35-40.
- Bureau of the Census. Law enforcement, courts and prisons. In: *Statistical Abstract of the United States 1988*. 108th ed. Washington, DC: US Dept of Commerce; 1989: 165-174.
- Vlahov D, Brewer F, Munoz A, Hall D, Taylor E, Polk BF. Temporal trends of human immunodeficiency virus type 1 (HIV-1) infection among inmates entering a statewide prison system. *J AIDS*. 1989;2:283-290.
- Horsburgh CR Jr, Jarvis JQ, McArthur T, Ignacio T, Stock P. Seroconversion to human immunodeficiency virus in prison inmates. *Am J Public Health*. 1990;80:209-210.
- Hoxie NJ, Vergeront JM, Frisby HR, Pfister JR, Golubjatnikov R, Davis JP. HIV seroprevalence and the acceptance of voluntary HIV testing among newly incarcerated male prison inmates in Wisconsin. *Am J Public Health*. 1990;80:1129-1131.