

Evolution of HIV/AIDS in California, 1981–2008

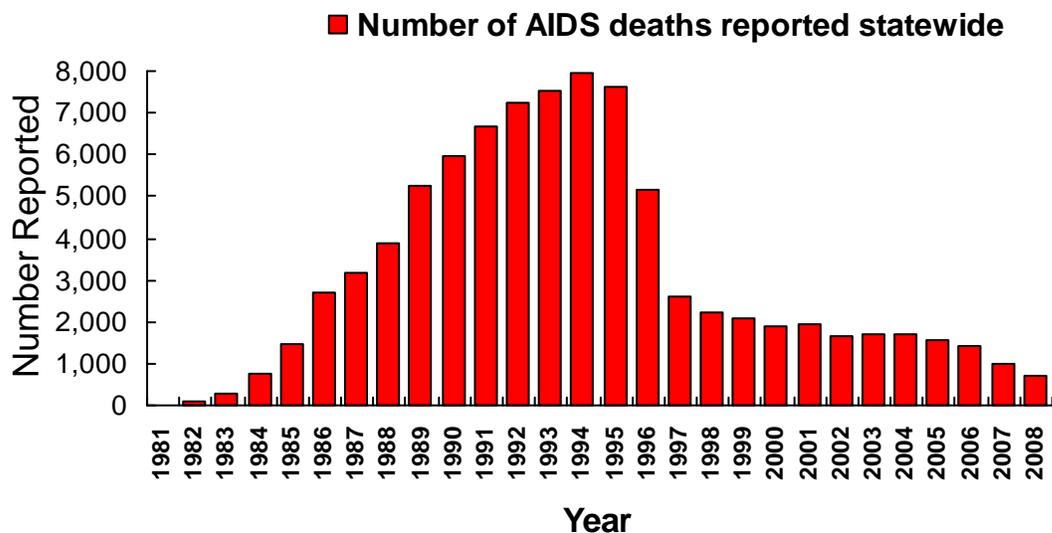
Tremendous strides have been made in HIV prevention, care, treatment, and surveillance nationally and in California. Below, we show markers of this progress in California.

Numerous studies document the impact and cost-effectiveness of the kinds of programs provided by the California Department of Public Health, Center for Infectious Diseases, Office of AIDS (OA) and a select few are highlighted in this paper.

I. Successes in Decreasing Annual AIDS Deaths in California

Great progress has been made in decreasing mortality among Californians diagnosed with AIDS.

Annual AIDS Deaths in California, 1981-2008



Annual AIDS deaths increased rapidly throughout the 1980s and peaked in 1994, fell dramatically with widespread HIV testing and effective antiretroviral treatment through 1998, and have slightly trended down in the past ten years. AIDS deaths dropped from 7,966 in 1994 to less than 1,710 each year since 2002. This death rate has held despite the number of persons living with AIDS (PLWA) rising from 52,416 in 2002 to 67,505 today (data through April 30, 2009), thus the proportion of people dying continues to decrease.

PLWA and HIV/AIDS Death Rates by Race/Ethnicity in California: Comparing 1995 (Prior to Highly Active Antiretroviral Therapy [HAART]) to 2005 (Ten Years after HAART)

Race/Ethnicity	PLWA			AIDS Death Rate (per 100,000)		
	1995	2005	% Change	1995	2005	% Change
White	19,092	28,782	50.8%	27.4	4.5	-84.7%
Hispanic/Latino	7,006	17,330	147.4%	16.3	2.9	-82.2%
African American	5,843	11,218	92.0%	61.9	16.8	-72.9%
Asian/Pacific Islander	754	1,826	142.2%	4.8	0.7	-85.4%
Native American	176	291	65.3%	17.2	3.7	-78.5%
All Californians	32,902	59,504	80.9%	24.1	4.2	-82.6%

Widespread availability of HAART and quality medical care in California has dramatically improved survival across all racial/ethnic groups in California. This dramatic improvement in survival has increased the number of PLWA in California. In particular, PLWA more than doubled among the Hispanic/Latino and Asian/Pacific Islander populations during the first ten years of the HAART era, but the death rate due to HIV/AIDS fell by over 82 percent for both groups.

II. Literature Review: Costs, Impact, and Cost-Effectiveness of HIV Care and Treatment

HIV Medications

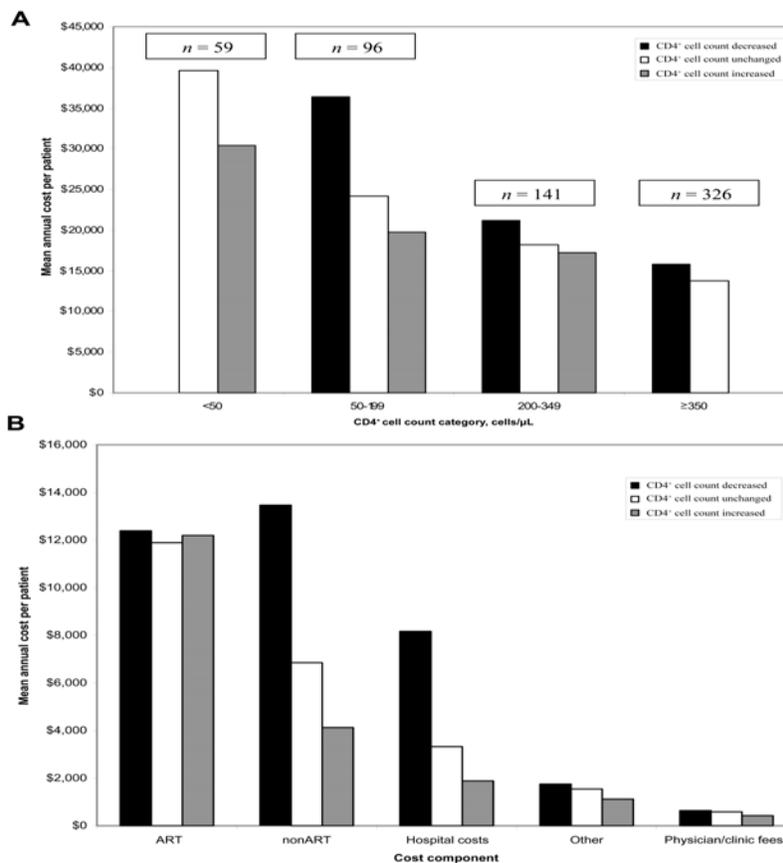
Costs: Antiretroviral medication is expensive, costing approximately \$10,000-\$15,000 per patient per year.

Impact: The impact of antiretroviral medication on HIV disease is dramatic and life-saving.

Cost Effectiveness: Analysis of health care expenditures demonstrates that HIV care is cost-effective.

A standard measure of HIV disease progression is CD4 cell count. Higher CD4 levels indicate a more functional immune system and better overall health; low CD4 levels are associated with increased morbidity and mortality. Across all levels of HIV disease (and associated CD4 levels) the cost of antiretrovirals remains relatively constant. But for patients with low CD4 levels, the costs associated with non-antiretroviral medication and hospital care outpace the cost of antiretroviral treatment.

A 2006 study demonstrated that compared with patients with CD4 cell counts greater than 350, patients with CD4 counts of less than 50 had hospitalization expenditures that were almost six-fold greater and non-antiretroviral medication expenditures that were almost eight-fold greater (charts A and B below).



The study concludes, “Our findings demonstrate a dramatic association between annual per patient expenditures and CD4 counts, with patients in the lowest CD4 category expending 2.6 times more health care dollars per year than patients in the highest CD4 cell count category.” (Chen et. al, 2006)

Medical Care

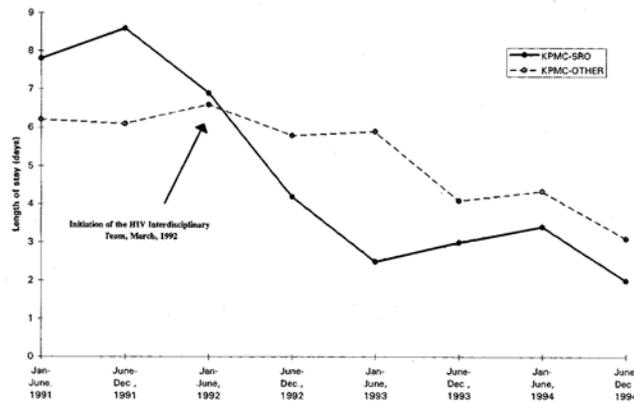
The success of antiretroviral treatment is accompanied by challenges. Medication side effects can range from uncomfortable (nausea and headache) to serious and even life-threatening. Chronic conditions, such as diabetes or heart disease, may develop as a result of HIV or its treatment, and require long-term treatment. Finally, many HIV-positive persons also suffer from other chronic or communicable illnesses such as hepatitis C virus or tuberculosis, and management of medication interactions can be difficult.

Given the complexity of patient care in HIV disease and the fact that HIV is a serious and communicable illness, simply making medication available is not sufficient. A

comprehensive care system is necessary to improve health outcomes for HIV-positive individuals and to protect public health.

The use of an interdisciplinary team for management of chronic illness has been demonstrated to be both effective and efficient for HIV disease as well as many other diseases. For example, among AIDS patients treated with a “coordinated care” model compared to AIDS patients in the same health care system who did not receive coordinated care, the mean number of days of hospital stay decreased from 7.8 per year to 2.01 per year (Figure 2 below).

Figure 2. Average Length of Hospital Stay for AIDS Patients

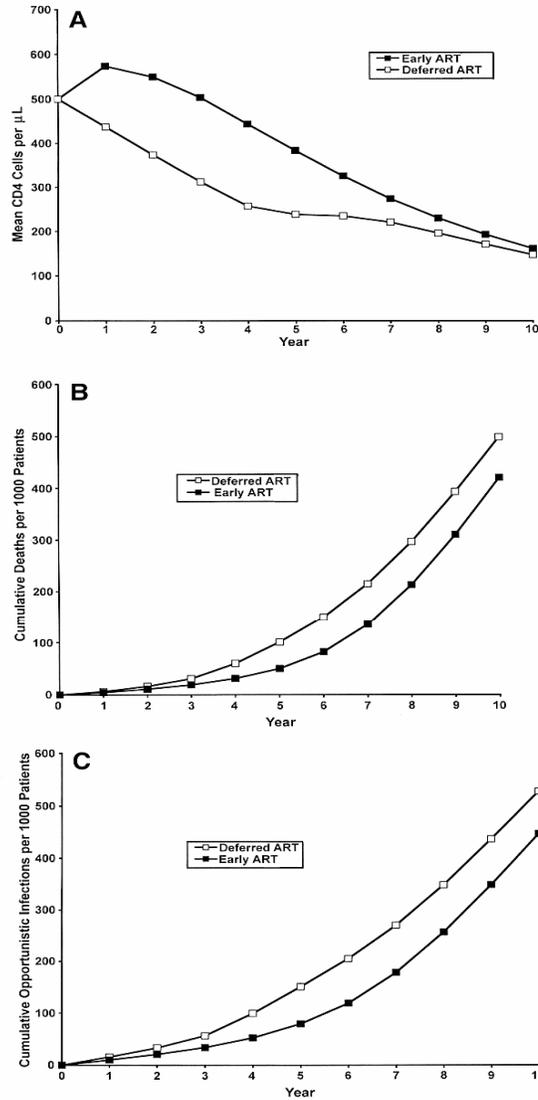


Plot shows rates of hospital use (visits or admissions) for HIV or AIDS patients seen at the Kaiser Permanente Medical Center in Santa Rosa (KPMC-SRO) and elsewhere throughout the Kaiser Permanente system in northern California (KPMC-others). Length of hospital stay was calculated as the number of inpatient days divided by the prevalence of AIDS as defined by the Centers for Disease Control. Source: Department of Medical Economics, Kaiser Permanente Medical Care Program, northern California. Reproduced by permission.

Future Challenges

Accumulating data suggests that treatment guidelines may be revised in the coming months or years to recommend even earlier initiation of antiretroviral therapy than is the current standard (at CD4 counts of less than 350).

A 2001 study published in the American Journal of Public Health used a cost-effectiveness framework to examine the impact of early treatment for HIV. They found that “...initiating antiretroviral therapy earlier (at 500 CD4 cells) rather than later (at 200 CD4 cells) resulted in a higher mean CD4 cell count (383 versus 238), 51 fewer deaths per 1,000 patients, and 72 fewer opportunistic infections per 1000 patients after five years.”

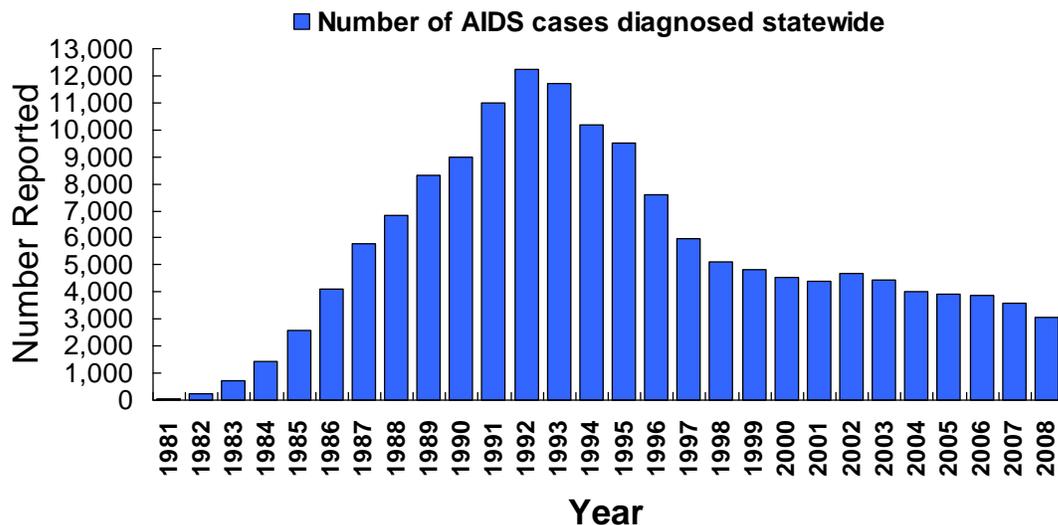


Note. Early antiretroviral therapy consists of indinavir, zidovudine, and lamivudine from cohort entry (500 CD4 cells/ μL), followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class). Deferred antiretroviral therapy consists of indinavir, zidovudine, and lamivudine after first measured CD4 cell count < 200/ μL , followed by second-line therapy consisting of 2 nucleoside reverse transcriptase inhibitors and 1 protease inhibitor (each with the average cost of all medications within its class).

III. Successes in Preventing New AIDS Diagnoses and HIV Infections

The combination of accessible HIV testing, HIV education and prevention programs, and effective treatment have also had a significant impact on the numbers of new AIDS cases diagnosed annually in California.

Annual AIDS Cases in California, 1981-2008



Annual AIDS diagnoses increased rapidly throughout the 1980s and peaked in the early 1990s, fell dramatically with widespread HIV testing and HAART use through 1998, and have slightly trended down in the past ten years. In 1992 there were 12,234 Californians diagnosed with AIDS. In contrast, fewer than 4,000 have been diagnosed with AIDS each year since 2005.

Effective Prevention among Those at Highest Risk

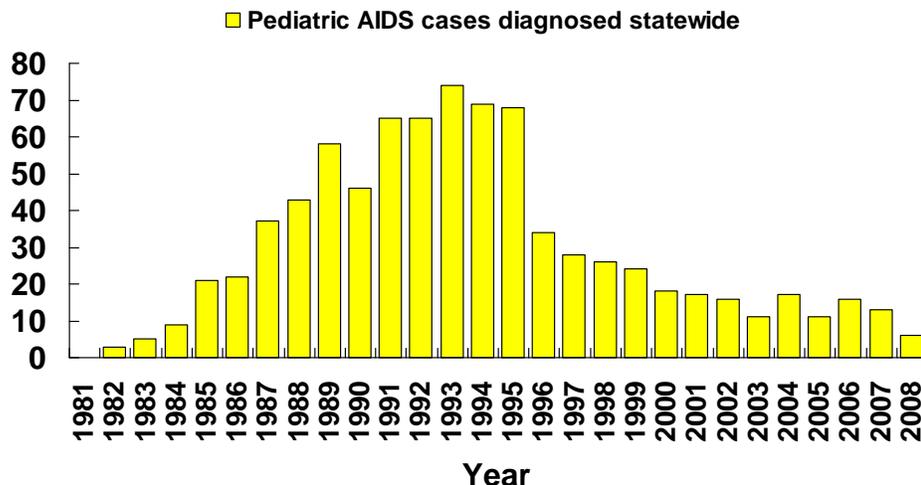
Given the rapidly rising numbers of AIDS cases diagnosed in the early years of the epidemic among men who have sex with men (MSM) and injection drug users (IDUs), prevention programs adopted strategies focused on these risk groups. These programs coupled with effective treatments that targeted HIV rather than AIDS-defining illnesses dropped new AIDS diagnoses within these risk groups.

	1992	1997	2002	2007
AIDS Cases Diagnosed among MSM	8,562	3,580	2,647	2,092
AIDS Cases Diagnosed among IDUs	1,401	845	538	334
AIDS Cases Diagnosed among MSM/IDUs	1,209	529	381	300
Total AIDS Cases Diagnosed	12,243	5,970	4,674	3,587

The number of AIDS cases diagnosed within the MSM, IDUs, and MSM/IDUs risk groups each fell by more than 75 percent in the 15 years between 1992 and 2007. The drop statewide was 70.7 percent, reflecting the expansion of the epidemic into the female population (albeit not via IDUs).

Reducing Mother-to-Child HIV Transmission via Widespread HIV Screening Coupled with HIV-Specific Perinatal Care

Annual Pediatric AIDS Cases in California, 1981-2008



The number of AIDS cases annually diagnosed in pediatric HIV exposure categories peaked at 75 in 1993 and has ranged between 11 and 17 each year since 2001 (a 75-85 percent decrease). This has occurred despite the fact that AIDS has increased among females throughout the time period.

	1992	1997	2002	2007
% Females among AIDS Cases Diagnosed	7.2	12.4	13.2	13.6
Females Living with AIDS (as of December 31)	1,568	3,784	5,632	7,221
Pediatric AIDS Cases Diagnosed	65	28	16	13

In the 15 years shown in the above table, the number of females living with AIDS more than quadrupled, yet the number of pediatric AIDS cases fell by 80 percent (comparing 1992 to 2007 – AIDS data for 2008 are not yet complete).

Reductions in New AIDS Cases Among Racial/Ethnic Groups

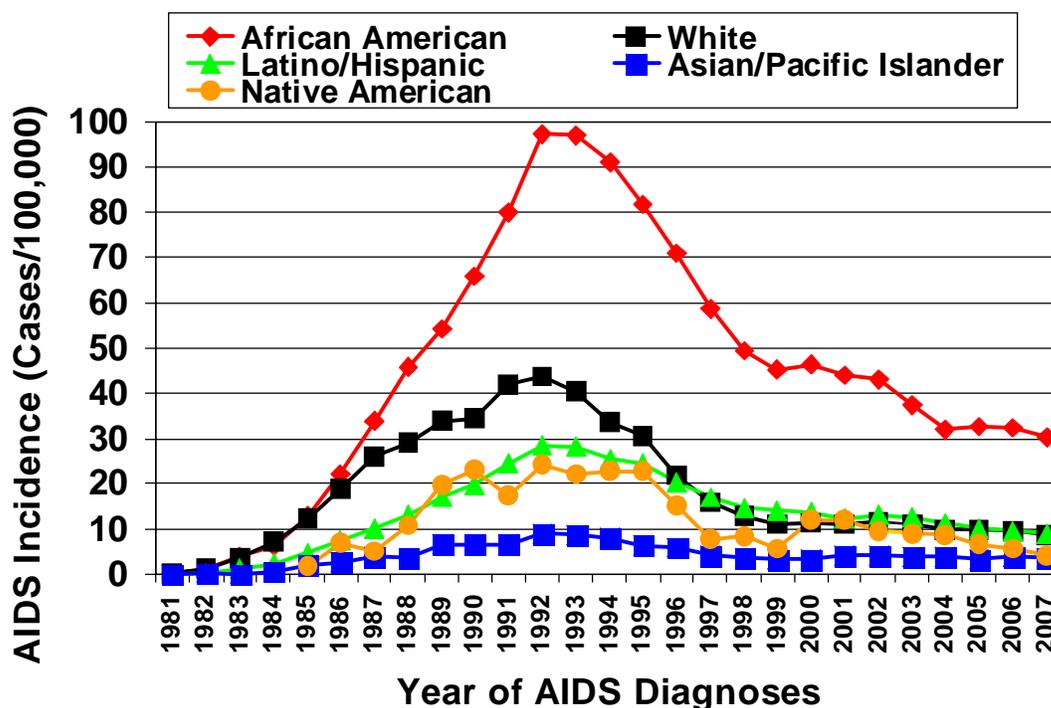
A similar trend is seen by comparing annually diagnosed AIDS cases and population sizes within racial/ethnic groups in California.

Race/Ethnicity	Population in California			AIDS Cases Diagnosed		
	1992	2007	%Change	1992	2007	%Change
White	17,017,720	15,674,055	-7.9%	7,412	1,375	-81.4%
Hispanic/Latino	8,510,470	13,991,096	64.4%	2,390	1,246	-47.9%
African American	2,173,340	2,525,307	16.2%	2,100	764	-63.6%
Asian/Pacific Islander	3,052,258	4,521,759	48.1%	266	166	-37.6%
Native American	233,199	337,201	44.6%	55	14	-74.5%
All Californians	30,986,987	37,810,180	22.0%	12,243	3,587	-70.7%

The table above shows that the fastest growing populations in California still show relative decreases in the number of AIDS cases diagnosed annually. During the 15-year period between 1992 and 2007, the Hispanic/Latino population grew by over 64 percent and yet the number of AIDS cases diagnosed still decreased by nearly one-half. Similarly, the Asian/Pacific Islander population grew by over 48 percent yet the number of AIDS cases diagnosed within it decreased by over one-third.

A yearly trend of the AIDS burden on racial/ethnic groups in California can be measured by annual AIDS incidence (cases per 100,000 population), which shows the rise and fall of AIDS rates as well as the disproportionate AIDS burden on the African American population in California:

AIDS Incidence (Cases per 100,000 population) by Race/Ethnicity in California, 1981-2007



New Technology to Estimate HIV Incidence

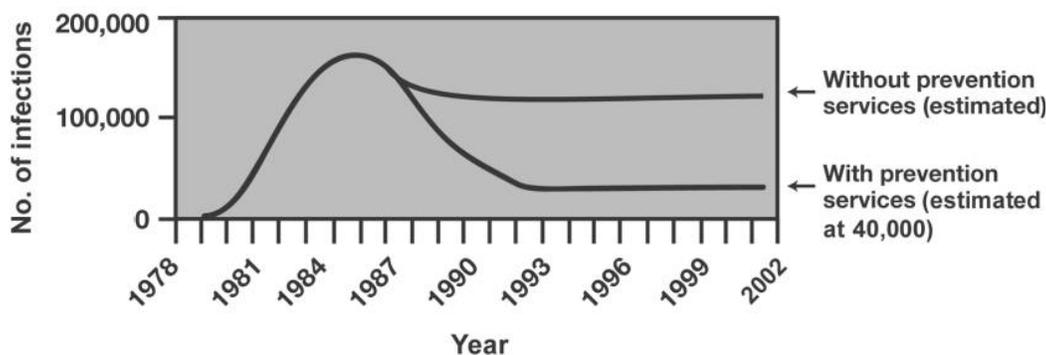
In 2005, OA, using prior estimates coupled with the limited HIV surveillance data, estimated that between 5,000 and 7,000 new HIV infections occur each year in California. Since that time, the Centers for Disease Control and Prevention (CDC) has produced estimates of the numbers of new yearly HIV infections occurring nationally. These estimates are generated using a specific blood test from newly diagnosed HIV cases to establish a time frame of when the actual infection occurred and are thus scientifically based. The 95 percent confidence interval for the national estimate (48,200 to 64,500 new infections) is consistent with the 5,000 to 7,000 range OA estimated for California in 2005, suggesting new HIV infections have been relatively steady in recent years. Moreover, confidence intervals for 2007 data from this HIV Incidence Surveillance Program in San Francisco (552 to 1,033) and Los Angeles (2,390 to 3,886) are generally consistent with the 5,000 to 7,000 range estimated for California.

IV. Literature Review: Effectiveness and Cost-Effectiveness of HIV Prevention

HIV prevention interventions include HIV education and risk-reduction interventions, Syringe Exchange and Secondary Syringe Exchange, Partner Services, linking individuals at high-risk for HIV to counseling and testing and HIV counseling and testing.

During 1985–2000, it is estimated that up to as many as 1.5 million HIV infections were averted in the United States, and the cost savings in terms of HIV associated medical care costs averted was approximately \$10 billion in federal, state, and private investments. The greater number of infections averted, the greater the cost savings per infection averted.

David Holtgrave, 2007
**“Evidence-Based Efforts to Prevent HIV Infection:
 An Overview of Current Status and Future Challenges”**



Cost-saving Behavioral Interventions to Prevent HIV Infection (Holtgrave, 2007)

At-risk MSM

- 1-session group
- 12-session group
- Peer-peer interaction in the community

At-risk MSM and/or women

- Video-based, 1-session intervention
- Social marketing of condoms
- Outreach-based services
- 7-session group

At-risk women

- Social marketing of condoms
- Outreach-based services
- 5-session group

IDUs

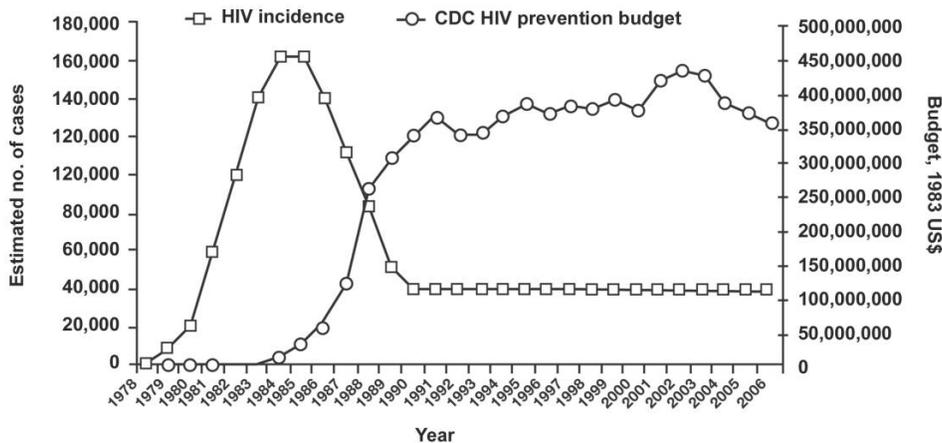
- Needle and syringe exchange
- Multisession group
- Substance-abuse treatment program

Patients at sexually transmitted diseases (STD) clinics

- HIV counseling and testing, linkage to HIV treatment, notification of sex partner(s)

NOTE: The list is not exhaustive and does not necessarily include cost effective interventions.

The effectiveness of HIV prevention interventions is correlated with the amount of funding available to support these interventions.



Meta-analyses have demonstrated that behavioral “Prevention for Positives” interventions can effectively promote safer behavior. Directing such interventions to populations at greatest risk for transmission of HIV is the most likely to make a significant impact on the pandemic (Fisher, Jeffrey et al. Current Opinion in HIV and AIDS, 2009).

A 2008 Cochrane Database Systemic Review meta-analysis of HIV prevention interventions for MSM concludes behavioral interventions reduce self-reported unprotected anal sex among MSM, HIV prevention intervention work, and they should be supported (Cochrane Database Syst Rev. 2008).

Similarly, behavioral interventions have been shown to reduce risk behaviors among IDUs (Des Jarlais et al, Psychosom Med, 2008). There is accumulated evidence that outreach-based interventions are effective in reaching out-of-treatment IDUs, providing a means for behavior changes. Despite declines in HIV incidence among IDUs, CDC notes there is a need to continue to focus HIV prevention strategies for people engaging in these behaviors.

CDC has estimated annual percentage change of HIV/AIDS diagnosis by HIV transmission category from 2001 through 2006 and determined that male-to-male sexual contact was the only risk group to have risen during that time period. To reduce the impact of HIV/AIDS, HIV prevention services that aim to reduce the risk for acquiring and transmitting infection among MSM and link infected MSM to treatment must be expanded.

Effective treatments delivered by accessible care and support programs have resulted in even-increasing numbers of people living with HIV and living longer. With about 1 million HIV-positive people in the United States, there are more potential opportunities for transmission now than there were a decade ago. Additionally, many more of the newly infected are people of color who may not have been reached by prior HIV prevention efforts. These changes in the epidemic, coupled with a lack of new resources for domestic HIV prevention, help explain why the rate of HIV infection has not continued to decline.

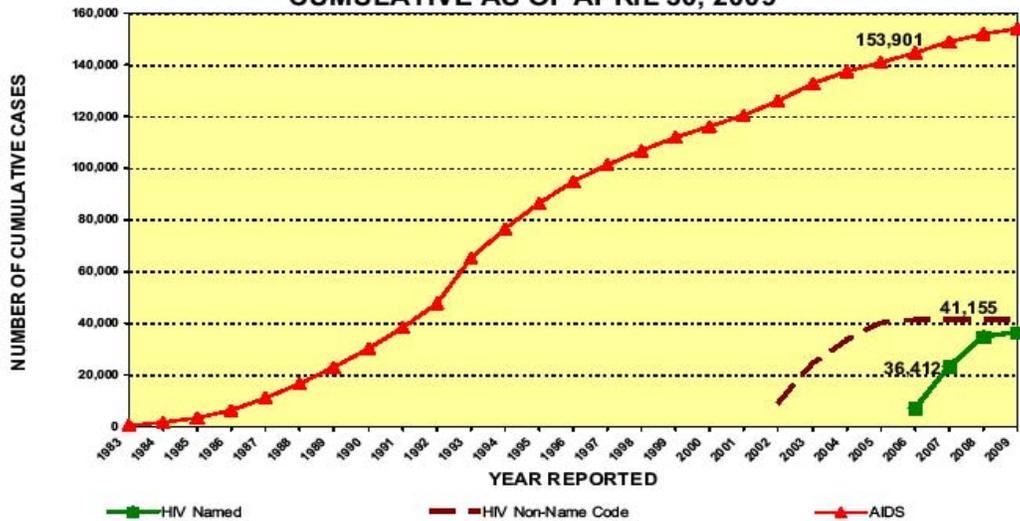
V. Rapidly Accruing HIV Surveillance System

HIV infection (without an AIDS diagnosis) has been a reportable condition in California for a much shorter time than AIDS, but cases have accrued into this surveillance system at a rapid pace due to aggressive active surveillance performed by local health departments and funded by OA. HIV infection became reportable in 2002 upon the implementation of HIV reporting by non-name code, and this system remained in effect until early 2006 after accruing over 41,000 cases. In April 2006, the code-based HIV reporting system was replaced by a names-based HIV reporting system.

The accumulation of names-based HIV cases has proceeded at or above expectations to date. April 30, 2009, marked the end of 36 full months of this reporting system, and 36,412 HIV (non-AIDS) cases have been reported. This represents over 88 percent of the 41,155 total number of cases accumulated in 45 full months of code-based HIV reporting. However, the 41,155 code-based count does not represent a full measure of HIV in California because the code-based system was not in effect long enough to accumulate all cases outstanding. Based on a national estimate for persons living with HIV published by CDC in October 2008, coupled with assumptions about California representation among national HIV cases, the number of names-based HIV cases in California will likely be closer to 50,000 than the 41,155 code-based count. The

numbers of HIV (non-AIDS) and AIDS cases reported to OA are updated monthly on OA's Web site. Presented here are two charts showing HIV/AIDS surveillance progress from the 15-page report posted monthly:

Figure 2. CALIFORNIA HIV/AIDS SURVEILLANCE SYSTEMS CUMULATIVE AS OF APRIL 30, 2009

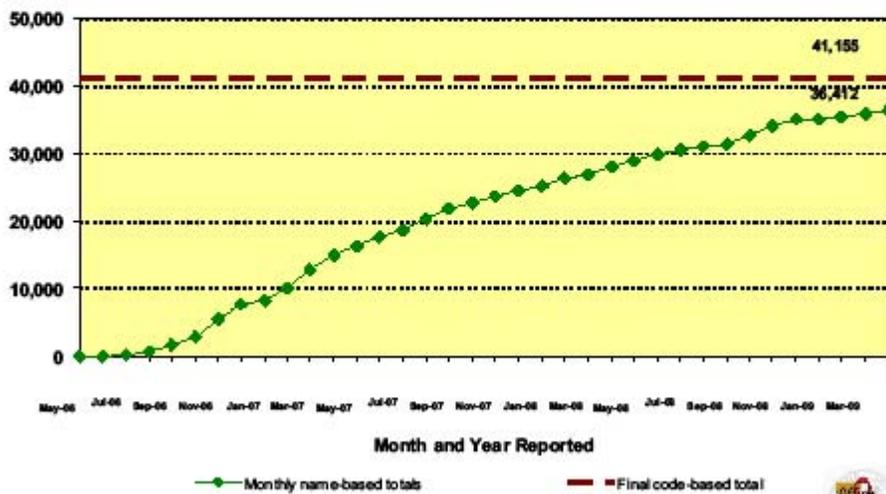


AIDS reporting began in March 1983.
 HIV case totals through March 2006 represent HIV cases reported by non-name code. Beginning April 2006, HIV case total is based on HIV cases reported by name. Due to reporting system differences, HIV cases reported by non-name code and name cannot be combined for unduplicated case counts.
 Source: California Department of Public Health, Office of AIDS, HIV/AIDS Case Registry, data as of April 30, 2009.
 For more information, call the HIV/AIDS Case Registry Section at (916) 449-5866.



NAME-BASED HIV CASES COMPARED TO FINAL CODE-BASED TOTAL CUMULATIVE AS OF APRIL 30, 2009

Figure 5.



May-06 data includes cases reported for both April and May 2006.
 HIV case totals through March 2006 represent HIV cases reported by non-name code.
 Beginning April 2006, HIV case totals are based on HIV cases reported by name.

