

Trends in the Hospitalization of Persons Living with HIV/AIDS in California, 1988 to 2008



Background

The HIV/AIDS Epidemic in the United States. In 1981, the first cases of AIDS (acquired immunodeficiency syndrome) were reported to the Centers for Disease Control and Prevention (CDC). Since that time, through December 2008, there were more than 1 million AIDS cases reported in the United States,¹ with approximately 152,000 of these being reported in California.² Also, at the end of 2008, there were 697,590 persons reported to be living with Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) in the U.S. with 107,789 of these reported in California.³ The number of new AIDS cases reported annually increased steeply from 1988 to about 1994. After the introduction of the antiviral cocktail of drug therapies in the mid-1990s, the numbers of new cases and deaths declined sharply. The population rate for new AIDS cases remained highest for Blacks from the 1980s until the present.⁴ (Figures 1, 2 and Table A4)

No vaccine is yet available to prevent HIV infection. However, survival of people infected with the virus was greatly improved by the introduction in 1997-1998 of a “cocktail” of effective antiretroviral drugs known as Highly Active Antiretroviral Therapy (HAART). Receiving HAART allows many HIV-infected people to survive much longer than was possible in the pre-HAART period of 1986-1996.⁵ In 1987, California implemented the AIDS Drug Assistance Program (ADAP) to help ensure that HIV-positive uninsured and under-insured individuals had access to medication.

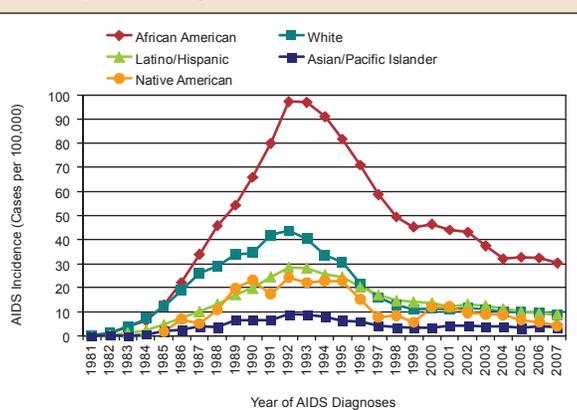
Additionally, in 1990, federal funding was made available to help people with HIV/AIDS keep their private health insurance coverage (CARE/HIPP).⁶

Purpose of This Report. This report makes use of HIV/AIDS surveillance data collected by the California Department of Public Health, Office of AIDS, plus hospital patient discharge data collected by the Office of Statewide Health Planning and Development, to assess trends in hospital care for persons diagnosed with HIV infection over the period 1988 to 2008. It shows the number of people living with HIV infection (including those with AIDS) and their hospitalization rates, broken out by age, race and ethnicity, and gender. It also shows 20-year trends in how many of these hospitalizations were related to the infections and mental problems that might reflect lack of preventive care.

Key Findings

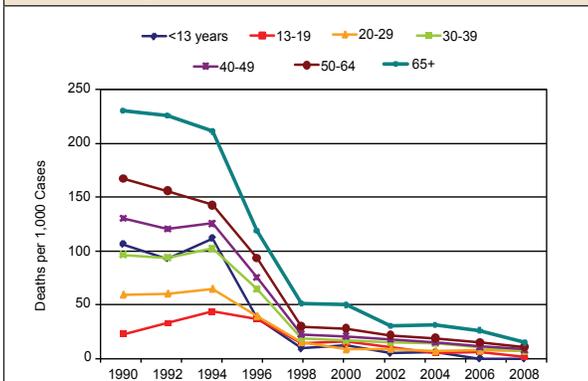
- The pool of people in California that could be hospitalized with a diagnosis of HIV infection (that is, the number of persons living with HIV/AIDS) continually grew between 1988 and 2008, from 37,000 to more than 107,000. This group is getting older and developing the illnesses of aging experienced by the general population.
 - o Although the number of persons living with HIV/AIDS grew, their hospitalization rate declined be-

Figure 1. New AIDS Cases per Year by Race/Ethnicity in California, 1981 to 2007



Source: Evolution of HIV/AIDS in California, 1981-2008. California Department of Public Health, Office of AIDS, Sacramento, 2009.

Figure 2. AIDS Mortality per 1,000 Persons Living with HIV/AIDS, by Age Group in California, 1990 to 2008



Data Sources: California Department of Public Health, Office of AIDS (number of persons living with HIV/AIDS) and Vital Statistics (Public Use Death Files)



tween 1988 and 2008, from a high of 400 per 1,000 cases to under 200.

- The percentage of these hospitalizations that ended with death rather than live discharge dropped from 13% to 5% during the 1988 to 2008 period.
 - Risk of death was higher for: older patients (age 40+ years), Hispanics and non-Hispanic Whites (beginning in the early 2000s) and those with infectious disease or additional chronic health problems.
- Increasingly, these hospitalizations were paid for by government insurance programs and admitted via the emergency room. The coverage of these hospitalizations between 1988 and 2008:
 - Increased for Medicare (from 6% to 33%) and Medi-Cal (from 31% to 37%);
 - Decreased for private insurance (from 50% to 19%).
- Perhaps reflecting the success of antiretroviral therapy:
 - By 2008 more than half of hospitalizations of people with HIV infection were for treatment of non-HIV/AIDS conditions;
 - The percentage of cases admitted with infectious diseases has steadily declined, although the percentage with drug-, alcohol-, and mental disorder-related diagnoses increased.

Trends in Hospitalization of Persons Living with HIV/AIDS, California, 1988 to 2008

Number of Persons Living with HIV/AIDS in California. Although the number of new AIDS cases reported each year rose until 1992 and then declined, the caseload of persons living with HIV/AIDS steadily increased. Between 1988 and 2008, the caseload rose 188%, from 37,471 to 107,789. The largest changes occurred in age

distribution. The percentage in the 20-29 and 30-39 year age groups dropped by half or more (24% to 7% and 44% to 19%, respectively). In contrast, the percentage in the 40-49 year age group rose from 22% to 40% and the percentage in the 50-64 year age group more than quadrupled, from 7% to 30%. The percentage of cases that belonged to the White population decreased from 71% to 47%, while the percentages belonging to the Black and Hispanic groups increased from 12% to 19% and from 14% to 30%, respectively. (Table 1; for detail, see Table A1)

Population Rates for Persons Living with HIV/AIDS. In 1988, there were 13 persons living with HIV/AIDS per 10,000 population in California and by 2008 this rate had doubled to 28. Initially it was highest for Blacks (22), followed by Whites (16), Hispanics (8), Native Americans (7), and Asian/Pacific Islanders (3). By 2008, it remained highest for Blacks (91), followed by Whites, Hispanics, Native Americans, and Asian/Pacific Islanders (33, 23, 23, and 7, respectively). The rate for males rose from 25 to 49 per 10,000, while the rate for females rose from 1 to 7 per 10,000. (Figure 3 and Table A3)

Hospitalizations with a Diagnosis of HIV/AIDS. In 1988, there were 431 hospitalizations of patients with a diagnosis of HIV/AIDS per 1,000 persons living with HIV/AIDS in California. The hospitalization rate peaked between 1990 and 1994 at around 460/1,000 and thereafter, steadily declined. Between 1998 and 2008, it dropped from 248 to 129 per 1,000 persons living with HIV/AIDS. Initially the rate was highest for the youngest persons living with HIV/AIDS (848/1,000 for cases under the age of 13) and oldest (541 and 640/1,000 for ages 50-64 and 65+ respectively). By 2008, the hospitalization rate was lowest for the under 13 age group (83/1,000) and fairly similar for the other age groups (107 to 156/1,000). (Figure 4 and Table A5)

Comparing racial and ethnic groups, the hospitalization rate was initially highest for Blacks (472) and Whites (449). It dropped for all groups during the 1996-1998 period, and by 2008 had fallen to

Table 1. Number of Persons Living with HIV/AIDS, California, 1988 and 2008

	1988		2008		% Difference 1988 to 2008
	Number	% of Cases	Number	% of Cases	
Total	37,471	100	107,789	100	188
Native American	123	0.3	491	0.5	299
Asian/Pacific Islander	638	2	3,621	3	468
Black	4,388	12	20,262	19	362
Hispanic	5,384	14	31,976	30	494
White	26,735	71	50,629	47	89
Multiple/Unknown	203	0.5	810	0.8	299
< 13 years	236	0.6	206	0.2	-13
13-19	303	0.8	534	0.5	76
20-29	9,068	24	7,431	7	-18
30-39	16,510	44	20,712	19	25
40-49	8,235	22	42,890	40	421
50-64	2,780	7	31,938	30	1,049
65+	339	0.9	4,078	4	1,103
Female	1,726	5	12,983	12	652
Male	35,634	95	93,917	87	164
Other	111	0.3	889	0.8	701

Data Source: California Department of Public Health, Office of AIDS

Figure 3. Reported HIV/AIDS Cases per 10,000 Population, by Race/Ethnicity, California, 1988 to 2008

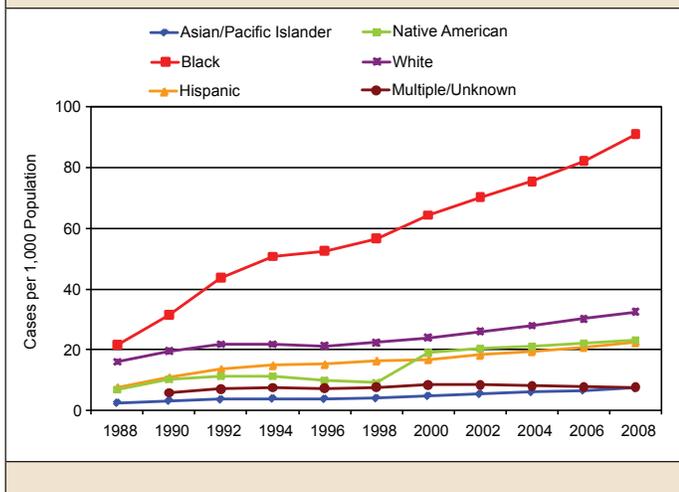


Figure 4. Hospitalizations with Diagnosis of HIV/AIDS per 1,000 Persons in Caseload by Age Group, California, 1988 to 2008

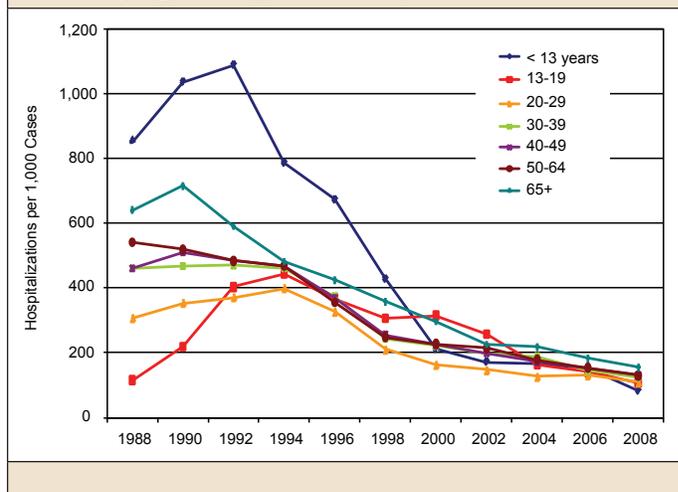


Figure 5. Hospitalizations with Diagnosis of HIV/AIDS per 1,000 Persons in Caseload by Race/Ethnicity, California, 1988 to 2008

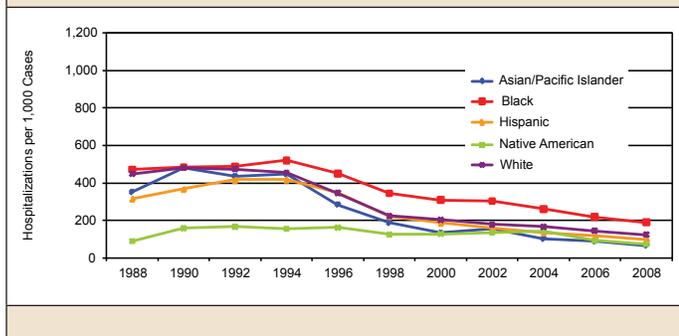
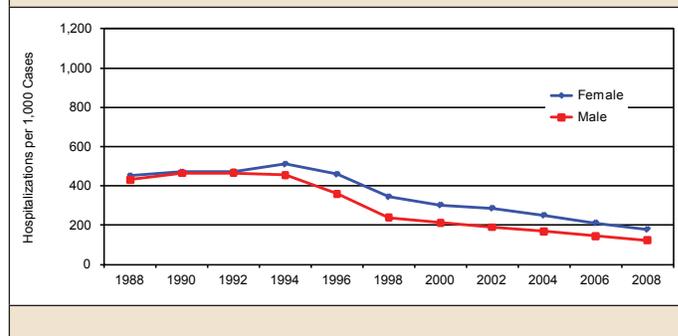


Figure 6. Hospitalizations with Diagnosis of HIV/AIDS per 1,000 Persons in Caseload by Gender, California, 1988 to 2008



189 for Blacks, 123 for Whites, and down to a range of 67 to 99 for the other groups. (Figure 5)

The hospitalization rate was higher for females throughout the 20 year period. Although the difference was relatively small up to 1996, the rate for females was higher by 45% or more from 1998 onward. Removal of obstetric admissions from the count of female cases had virtually no effect on these rates, due to the small number of admissions for pregnancy and delivery each year. (Figure 6)

Hospitalizations Among Patients with Diagnosis of HIV/AIDS, Female Percentage and Number of Birth-Related Cases. The percentage of persons living with HIV/AIDS in California that were female increased from 5% to 12% between 1988 and 2008. The percentage of hospitalizations with a diagnosis of

HIV/AIDS that were female increased from 5% to 17% during the same period. The female percentage among the hospitalizations, 1988 to 2008, was consistently higher for the age group 13-19 years old (rising from 37% to nearly 66% in 2006), followed by those in the 20-29 year old group (rising from 5% to 25%). The female percentage was consistently higher for hospitalizations among Blacks (rising from 11% to 26%). (Tables A6 and A7)

The number of hospitalizations for pregnancy and childbirth among women with a diagnosis of HIV/AIDS increased from 7 to 70 per year between 1988 and 1996. From 2000 through 2008, it varied between 66 and 104 per year. The number of newborns with a diagnosis of HIV/AIDS varied between 0 and 3 per year during the period covered by this analysis. (Table 2; for detail, see Table A8)

Table 2. Pregnancy and Birth Hospitalizations with HIV/AIDS Diagnosis, California Hospitals, 1988 and 2008

Major Diagnostic Code	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
14: Pregnancy, Childbirth	7	12	27	32	70	40	66	96	104	81	73
15: Newborn, Neonates	0	3	0	2	1	3	1	3	0	1	1

Characteristics of Hospitalizations of Persons Diagnosed with HIV/AIDS. (See Table A9).

Payer. Medicare covered 6% of hospitalizations for patients diagnosed with HIV/AIDS in 1988. This increased to 29% by 1998, and then remained between 32% and 33% through 2008. Medi-Cal covered about a third of these hospitalizations each year, while the percentage covered by private insurance declined from 50% to 19%. (Figure 7)

Source of Admission. From 1988 to 2008, the percentage of HIV/AIDS cases originating in the emergency room increased steadily, from 41% to 70%, while the percentage admitted from home without an ER visit dropped from 55% to 21%. (Figure 8)

Disposition. The percentage of the hospitalizations discharged to a skilled nursing facility increased from 2% to 10%, while the percentage discharged with home health services declined from a high of 15% in 1994 to 8% in 2008. The percentage with a final disposition of death dropped from 13% in 1988 to 5% by 2008. (Figure 9)

Figure 7. Percentage of Hospitalizations of Patients with HIV/AIDS that were Covered by the Main Types of Payer, California Hospitals, 1988 to 2008

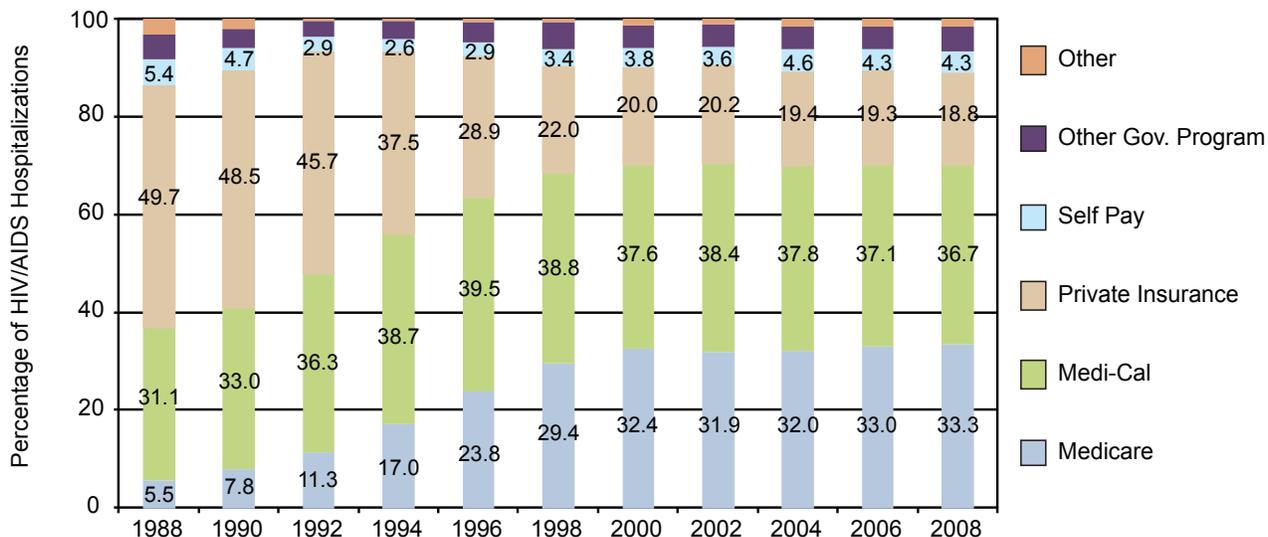


Figure 8. Source of Admission for Hospitalizations of Patients with HIV/AIDS, California Hospitals, 1988 to 2008

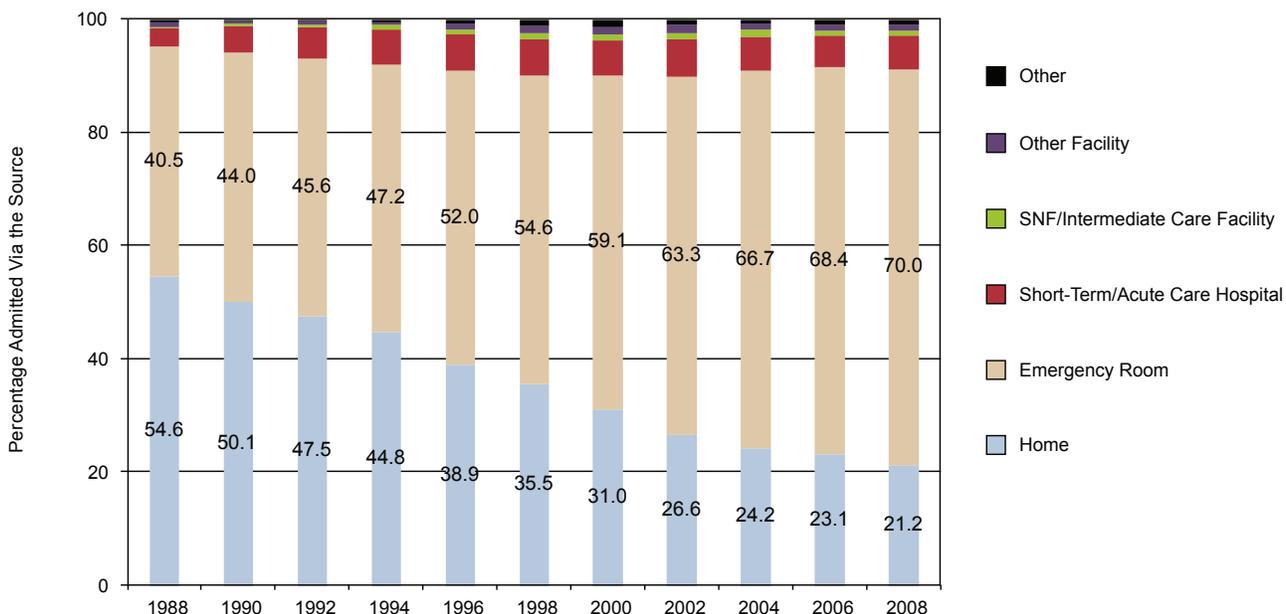


Figure 9. Final Disposition of Hospitalizations of Patients with HIV/AIDS, California Hospitals, 1988 to 2008

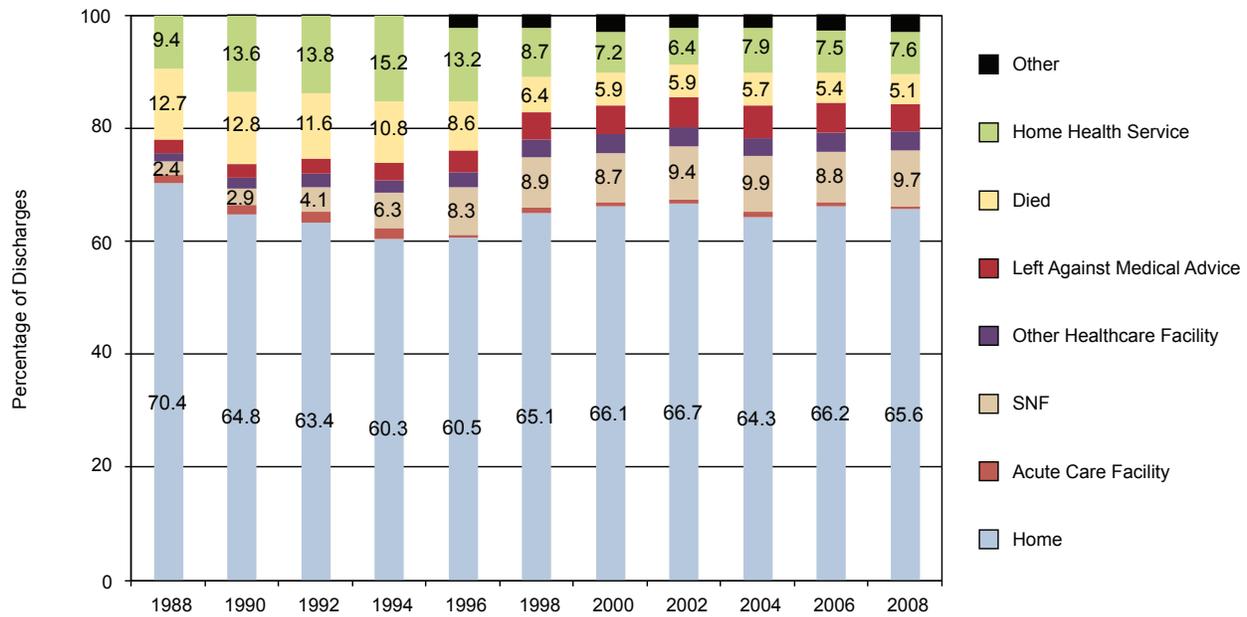
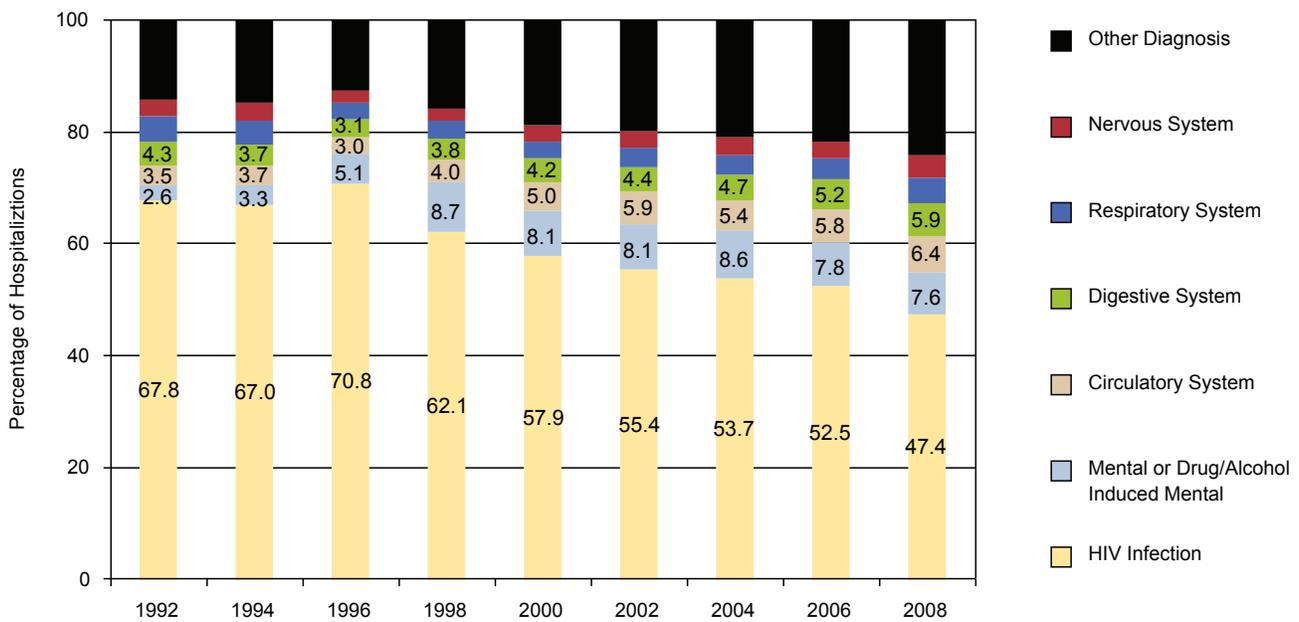


Figure 10. Principle Types of Care Given to Patients with HIV/AIDS Based on Major Diagnostic Category (MDC), California, 1988 to 2008



Note: Specific MDC for HIV/AIDS was not introduced until 1992.

Main Reason for Hospitalization of Patients with HIV/AIDS.

The percentage of hospitalizations of HIV/AIDS cases that were mainly admitted for HIV/AIDS-related treatment dropped from 70% in 1996 to 47% by 2008. The percentage that were admitted for mental and alcohol/drug-related diagnoses increased from 3% to nearly 8%, while the percentage for treatment of cardiovascular and other circulatory system problems rose from 4% to more than

6%. Note that the Major Diagnostic Code for HIV/AIDS hospitalizations (MDC = 25) was not introduced until 1992. (Figure 10 and Table A10)

Additional Diagnoses of Infectious Disease and Mental/Behavioral Problems among Hospitalizations of Persons with HIV/AIDS. Certain opportunistic infections and cancers that are

rare among people with normal immune function were diagnosed in people with HIV infection as their immune systems weakened. They were part of the 1993 AIDS case definition used by the Centers for Disease Control and Prevention.⁷ In this analysis we found that until the mid-1990s about half of the HIV/AIDS-related hospital cases had one or more of these infections. In 1998, after introduction of HAART, the percentage dropped to 29% and by 2008 it was 20%. At the peak year (1994) for opportunistic infections, the numbers were highest for cytomegalovirus (5,294), pneumocystosis (4,947), and candidiasis (4,240). By 1998, they had declined by more than 50% and thereafter, the number of cases remained about the same through 2008, with candidiasis (1,403) and pneumocystosis (1,019) having the highest numbers. There were 2,441 cases of Kaposi's sarcoma (KS) reported for people admitted with HIV/AIDS in 1992. The number of KS cases dropped to 504 in 1998 and continued dropping, reaching 158 by 2008. (Table A13)

In comparison, the number of hospitalizations with diagnoses of mental- or behavior-related disorders increased steadily from 1988 to 2004 and then began to decline. The volume of cases was consistently highest for drug-related diagnoses (peaked at 3,709 in 2004), followed by cases with diagnoses of psychosis and depression (peaked at 2,153 and 2,058 respectively). (Table A13)

The percentage of cases with at least one infectious disease diagnosis consistently declined from 1988 to 2008, while the percentage with at least one mental/behavioral diagnosis steadily increased. About 43% involved neither type of diagnosis, while 5%-10% involved both. (Figure 11 and Table A14)

Infectious Disease Diagnoses. Using additional statistical analyses we found the likelihood of having one or more of the opportunistic infections was higher for the following:

- Asian/Pacific Islanders (most years) and for Hispanics (1994 and onward);
- Self-paying cases (2000-2008), but lower for cases covered by Medicare across all years of this study;

- Males (up to the year 2000) and patients in the 20-29 year age group. (Table A15)

Mental/Behavioral Diagnoses. This group of diagnoses includes risk factors for exposure to HIV, such as intravenous drug use, as well as conditions that may be related to AIDS itself. (See Appendix Table A13 for a list of the mental/behavioral conditions that were included.) We found that the percentage of HIV/AIDS-related hospitalizations that included one or more of these conditions increased steadily from 1988 to 2008. Using additional statistical analyses we found these diagnoses were more common for:

- Patients in the age range of 30-64, compared to patients 20-29. However, it was lower for patients under age 20 and in the age range of 65+ years;
- Females, for most years;
- Blacks up to 1998, then lower; generally lower for Asian/Pacific Islanders and Hispanics;
- Cases covered by Medicare, Medi-Cal, other government programs, and self-pay. (Table A16)

In-Hospital Death Rates. The percentage of these hospitalizations that ended with death steadily declined, from 13% in 1988 to 5% in 2008. (Figure 12) Risk of dying was the same for males and females, but it was significantly higher for:

- Patients over age 30 (until the year 2000) and over age 40 thereafter;
- Patients covered by Medi-Cal (until 1996), but lower for those covered by Medicare;
- Hispanics but lower for Blacks. Race and ethnicity were not associated with mortality during 1990-1996;
- Patients with at least one infectious disease or with additional "comorbid" illnesses, as measured by the Charlson Comorbidity Index (CCI) Score. (For details about the CCI, see Technical Notes.) (Table A17)

Figure 11. Percentage of HIV/AIDS Hospitalizations with Infectious Disease and/or Mental Disorder Comorbidities, California Hospitals, 1988 to 2008

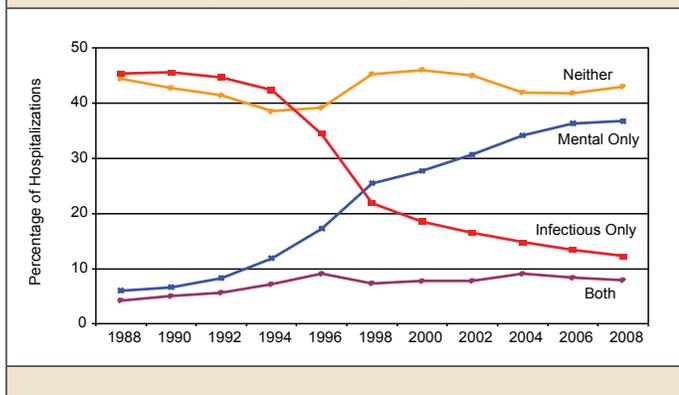
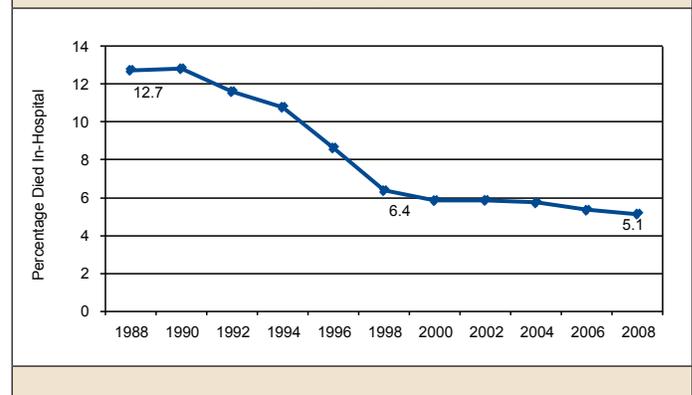


Figure 12. Percentage of Hospitalizations for HIV/AIDS Cases that Resulted in In-Hospital Death, California Hospitals, 1988 to 2008



Summary and Conclusions

Main Findings

- Although the incidence of new AIDS cases reported each year dropped after 1992, the number of persons living with HIV/AIDS continued to increase.
- Population rates for persons living with HIV/AIDS have increased most steeply for people ages 40+ years and for Blacks.
- The hospitalization rate for people having a diagnosis of HIV/AIDS has declined from a high of 400 per 1,000 cases to under 200.
- This group is aging and developing the illnesses of aging experienced by the general population.
- From 1988 to 2008, hospitalization rates have remained consistently highest for Blacks. The groups with the second highest were Whites (most years) and Hispanics (from 1996 onward).
- Hospitalizations for HIV/AIDS are increasingly admitted via the emergency room and admitted to the hospital for treatment of conditions other than HIV/AIDS.

The insurance coverage for these hospitalizations shifted significantly:

- Up for Medicare, from 6% to 33%
- Up for Medi-Cal, from 31% to 37%
- Down for private insurance, from 50% to 19%

The percentage of hospitalizations of people with HIV/AIDS that included an AIDS-related infectious disease steadily decreased. It has been consistently higher for:

- Patients covered by private insurance or paying out-of-pocket
- Patients belonging to Asian/Pacific Islander and Hispanic population groups

In contrast, the percentage of hospitalizations of people with HIV/AIDS that included a drug-, alcohol-, mental health-related diagnosis has steadily increased. It has consistently been higher for:

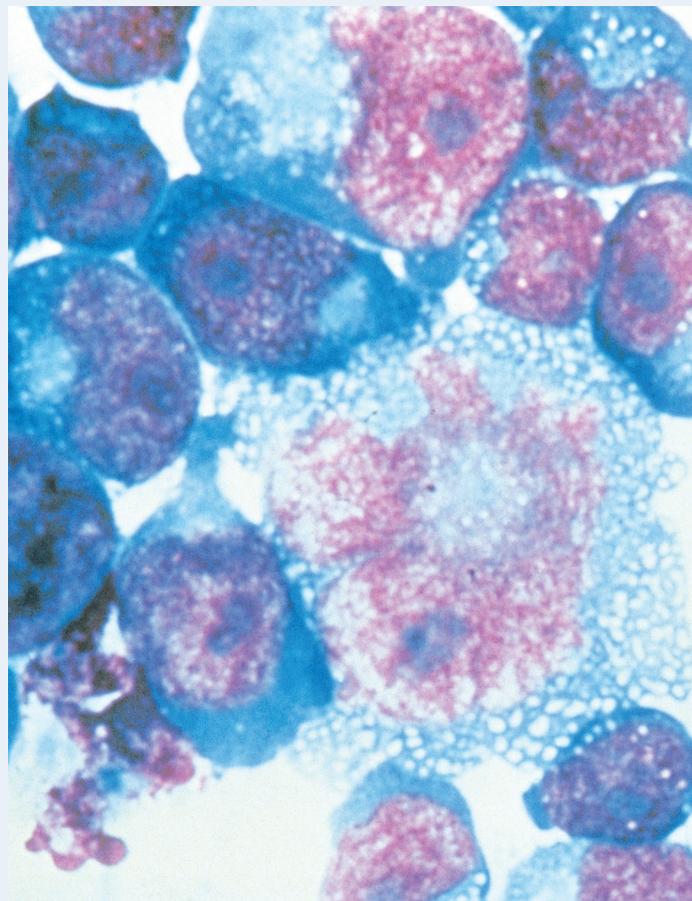
- Patients not covered by private insurance
- Patients belonging to Black or (after 2000) Native American populations

There was a major decline in the in-hospital mortality rate between 1994 and 1998. It has since stabilized. The strongest risk factors for in-hospital death were: older age (40+ years) and having, in addition to HIV/AIDS, either an infection or a chronic disease. The patient's racial/ethnic group made a difference only at the beginning (1988) and then later, starting in 1998, with risk of death higher for Hispanics in most years. There was no difference between males and females in risk of dying.

To address racial/ethnic differences in the likelihood of having an infectious disease or mental/behavioral diagnosis, it could be useful to review access patterns for community-based treatment programs, including the languages used for outreach and patient education. The steady increase in the number of hospitalizations that involve mental/behavioral diagnoses suggests that prevention programs targeting these problems could be more widely available or accessible, with increased outreach to high-risk groups.

Increasingly, hospitalizations among people diagnosed with HIV/AIDS are for older age groups. They are admitted for illness other than AIDS and related comorbidities and are increasingly discharged to long-term care and skilled nursing. It could be useful for hospitals to review how end-of-life questions are managed for this group. Also, because of the closure of many long-term care and skilled nursing facilities in California, it is not clear that there will be sufficient capacity in the state to care for this growing group of patients.

Following the introduction of HAART there was a significant drop in hospitalization rates for people diagnosed with HIV/AIDS, as well as drops in how many of the cases were admitted with opportunistic infection and how many died in-hospital. If access to the antiretroviral drug therapy is compromised, it is possible that these trends would be reversed.



HIV-infected T-cells under high magnification.

APPENDIX

Table A1. Number of Persons Living with HIV/AIDS, California, 1988 to 2008

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008	% Change
Total		37,471	49,226	59,434	62,410	62,126	67,208	74,431	82,910	90,645	98,605	107,789	188
Race/ Ethnicity	Native American	123	196	264	309	309	320	351	393	422	457	491	299
	Asian/Pacific Isl.	638	903	1,127	1,327	1,375	1,580	1,876	2,266	2,681	3,082	3,621	468
	Black	4,388	6,637	9,508	11,153	11,616	12,843	14,289	15,788	17,010	18,405	20,262	362
	Hispanic	5,384	7,905	10,865	12,680	13,773	15,910	18,743	21,852	24,923	28,217	31,976	494
	White	26,735	33,283	37,275	36,506	34,613	36,071	38,622	41,976	44,914	47,703	50,629	89
	Multiple/Unknown	203	302	395	435	440	484	550	635	695	741	810	299
Age	< 13 years	236	311	409	457	424	435	422	390	336	269	206	-13
	13-19	303	265	243	253	272	277	321	368	404	482	534	76
	20-29	9,068	10,112	10,086	8,340	7,031	6,046	5,135	5,065	5,357	6,232	7,431	-18
	30-39	16,510	22,255	27,139	28,580	27,655	28,055	28,149	26,861	24,216	22,018	20,712	25
	40-49	8,235	11,924	15,912	18,147	19,425	22,774	27,325	32,855	37,802	41,005	42,890	421
	50-64	2,780	3,925	5,087	6,022	6,669	8,780	11,916	15,820	20,344	25,646	31,938	1,049
	65+	339	434	558	611	650	841	1,163	1,551	2,186	2,953	4,078	1,103
Gender	Female	1,726	2,792	4,376	5,579	6,443	7,457	8,577	9,745	10,738	11,792	12,983	652
	Male	35,634	46,229	54,745	56,456	55,243	59,199	65,222	72,463	79,126	85,972	93,917	164
	Other	111	205	313	375	440	552	632	702	781	841	889	701

Data Source: California Department of Public Health, Office of AIDS. See Technical Notes, Limitations on page 15 for changes in case reporting.

Table A2. Percentage of Persons Living with HIV/AIDS, California, 1988 to 2008

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008	% Change
Race/ Ethnicity	Native American	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	39
	Asian/Pacific Isl.	1.7	1.8	1.9	2.1	2.2	2.4	2.5	2.7	3.0	3.1	3.4	97
	Black	11.7	13.5	16.0	17.9	18.7	19.1	19.2	19.0	18.8	18.7	18.8	61
	Hispanic	14.4	16.1	18.3	20.3	22.2	23.7	25.2	26.4	27.5	28.6	29.7	106
	White	71.3	67.6	62.7	58.5	55.7	53.7	51.9	50.6	49.5	48.4	47.0	-34
	Multiple/Unknown	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	39
Age	< 13 years	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	0.4	0.3	0.2	-70
	13-19	0.8	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	-39
	20-29	24.2	20.5	17.0	13.4	11.3	9.0	6.9	6.1	5.9	6.3	6.9	-72
	30-39	44.1	45.2	45.7	45.8	44.5	41.7	37.8	32.4	26.7	22.3	19.2	-56
	40-49	22.0	24.2	26.8	29.1	31.3	33.9	36.7	39.6	41.7	41.6	39.8	81
	50-64	7.4	8.0	8.6	9.6	10.7	13.1	16.0	19.1	22.4	26.0	29.6	299
	65+	0.9	0.9	0.9	1.0	1.0	1.3	1.6	1.9	2.4	3.0	3.8	318
Gender	Female	4.6	5.7	7.4	8.9	10.4	11.1	11.5	11.8	11.8	12.0	12.0	161
	Male	95.1	93.9	92.1	90.5	88.9	88.1	87.6	87.4	87.3	87.2	87.1	-8

Data Source: California Department of Public Health, Office of AIDS. See Technical Notes, Limitations on page 15 for changes in case reporting.

Table A3. Number of Persons Living with HIV/AIDS per 10,000 Population, California, 1988 to 2008

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total		13.2	16.5	19.2	19.8	19.4	20.5	21.8	23.4	24.9	26.5	28.3
Race/ Ethnicity	Native American	6.9	10.3	11.3	11.4	10.0	9.2	19.0	20.4	21.1	22.2	23.2
	Asian/Pacific Isl.	2.6	3.3	3.7	4.0	3.9	4.1	4.8	5.5	6.1	6.7	7.4
	Black	21.7	31.5	43.7	50.8	52.5	56.7	64.3	70.2	75.4	82.1	90.9
	Hispanic	7.6	10.9	13.6	14.9	15.3	16.5	16.9	18.4	19.6	20.9	22.5
	White	16.0	19.6	21.9	21.9	21.3	22.4	24.0	26.0	28.0	30.2	32.5
	Multiple/Unknown	*	5.9	7.2	7.6	7.4	7.7	8.5	8.5	8.2	7.8	7.7
Age	< 13 years	0.4	0.5	0.6	0.7	0.6	0.6	0.6	0.5	0.5	0.4	0.3
	13-19	1.0	0.9	0.8	0.8	0.9	0.8	0.9	1.0	1.0	1.2	1.3
	20-29	17.1	18.8	19.2	16.6	14.3	12.2	10.7	10.6	11.0	12.3	13.9
	30-39	33.5	42.0	49.4	51.7	50.6	51.4	50.7	48.0	44.0	41.0	39.1
	40-49	24.6	31.8	39.2	42.3	42.7	47.9	53.7	60.8	67.1	72.2	75.8
	50-64	8.2	11.3	14.3	16.4	17.5	21.0	25.4	30.8	36.4	42.6	49.6
	65+	1.2	1.4	1.8	1.9	2.0	2.5	3.2	4.1	5.6	7.3	9.6
Gender	Female	1.2	1.9	2.8	3.5	4.0	4.5	5.0	5.5	5.9	6.3	6.8
	Male	25.1	31.0	35.4	35.9	34.7	36.2	38.3	41.0	43.4	46.2	49.4

*No population estimate for Multiple/Unknown race and ethnicity available for 1988.

Table A4. Number of AIDS Deaths per 1,000 Persons Living with HIV/AIDS, California, 1988 to 2008

		1988*	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total			103.5	101.6	108.7	68.4	21.6	19.7	17.3	15.4	12.1	8.9
Race/ Ethnicity	Native American		76.5	37.9	74.4	45.3	21.9	28.5	17.8	42.7	13.1	14.3
	Asian/Pacific Isl.		96.3	88.7	117.6	74.9	19.6	11.7	17.7	13.8	6.8	11.6
	Black		93.3	97.2	103.1	74.2	25.1	25.3	23.3	18.8	16.4	12.5
	Hispanic		96.8	93.3	100.8	69.6	21.7	19.0	16.5	15.0	10.8	8.2
	White		108.2	107.0	114.4	66.7	20.5	18.5	15.7	14.4	11.6	7.7
	Multiple/Unknown		13.2	0.0	9.2	13.6	4.1	5.5	4.7	5.8	4.0	2.5
Age	< 13 years		106.1	92.9	111.6	37.7	9.2	11.8	5.1	6.0	0.0	0.0
	13-19		22.6	32.9	43.5	36.8	14.4	15.6	10.9	5.0	6.2	1.9
	20-29		59.4	60.4	64.9	39.5	15.2	8.6	9.1	6.9	7.4	7.1
	30-39		96.4	93.8	102.2	64.4	19.0	16.4	15.1	14.2	10.1	6.9
	40-49		130.2	120.5	125.4	75.3	22.5	20.7	18.0	14.8	11.2	8.3
	50-64		167.1	155.7	142.6	93.3	29.7	27.8	21.5	18.8	14.9	10.7
	65+		230.4	225.8	211.1	118.5	51.1	49.9	30.3	31.1	26.1	14.7
Gender	Female		75.2	71.3	85.9	57.9	27.1	23.4	21.1	18.3	14.8	12.1
	Male		105.6	104.6	111.7	70.2	21.1	19.5	17.0	15.2	11.8	8.5

*Death data not available for 1988 for this report.

Table A5. Number of Hospitalizations with Diagnosis of HIV/AIDS per 1,000 Persons Living with HIV/AIDS, California, 1988 to 2008

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total		430.7	462.7	463.5	458.0	367.6	248.3	221.1	199.4	176.5	150.9	128.7
Race/ Ethnicity	Native American	89.4	158.2	166.7	155.3	161.8	125.0	128.2	134.9	142.2	91.9	73.3
	Asian/Pacific Isl.	351.1	481.7	435.7	445.4	284.4	186.7	133.8	153.6	102.2	89.6	66.6
	Black	471.5	484.4	487.6	520.0	450.4	344.2	308.6	303.1	260.2	218.0	189.4
	Hispanic	316.7	368.1	416.7	417.9	349.8	222.4	186.9	158.5	136.7	116.7	99.4
	White	448.8	480.5	473.5	454.9	346.1	223.3	203.4	178.1	166.1	143.6	123.3
	Multiple/Unknown	640.4	632.5	503.8	551.7	831.8	708.7	714.5	634.6	543.9	545.2	414.8
Age	< 13 years	847.5	1,035.4	1,088.0	785.6	672.2	427.6	210.9	171.8	166.7	152.4	82.5
	13-19	115.5	218.9	403.3	442.7	367.6	306.9	314.6	258.2	163.4	141.1	106.7
	20-29	306.8	353.4	370.6	398.4	326.1	210.4	164.2	147.5	127.3	131.7	109.9
	30-39	460.8	467.5	470.1	461.7	374.0	244.1	221.5	199.4	188.3	145.0	124.2
	40-49	460.5	509.3	485.0	467.4	369.2	255.4	224.7	198.4	173.0	153.1	130.5
	50-64	541.4	518.5	483.8	468.1	355.1	248.4	227.2	214.7	178.1	153.6	130.8
	65+	640.1	714.3	589.6	481.2	424.6	357.9	296.6	225.7	217.7	182.5	155.5
Gender	Female	451.9	471.3	472.6	511.7	460.2	344.6	302.6	286.4	250.3	211.2	178.1
	Male	431.0	464.2	465.4	455.7	359.6	238.5	212.6	189.5	168.2	144.0	123.1

Table A6. Percentage of Hospitalizations with Diagnosis of HIV/AIDS that were Female, by Age Group, California, 1988 to 2008

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total	4.8	5.8	7.5	10.0	13.0	15.4	15.8	16.9	16.8	16.7	16.7
< 13 years	36.0	31.7	43.6	59.9	61.1	30.6	42.7	40.3	44.6	56.1	64.7
13-19	37.1	39.7	26.5	29.5	29.0	56.5	49.5	46.3	66.7	66.2	43.9
20-29	4.8	7.0	11.2	14.7	20.3	21.6	33.2	29.7	26.8	22.5	24.5
30-39	3.7	4.9	6.1	7.8	10.9	14.5	14.2	15.3	15.9	17.8	18.2
40-49	3.9	4.1	5.6	9.4	12.5	14.8	15.1	17.0	16.1	14.9	13.8
50-64	5.6	5.7	6.4	8.2	9.8	12.8	13.4	15.2	16.4	16.8	17.2
65+	21.7	21.0	16.7	19.7	15.9	16.9	14.2	16.0	14.3	13.2	18.1

Table A7. Percentage of Hospitalizations with Diagnosis of HIV/AIDS that were Female, by Race/Ethnicity, California, 1988 to 2008

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total	4.8	5.8	7.5	10.0	13.0	15.4	15.8	16.9	16.8	16.7	16.7
Native American	54.5	6.5	15.9	10.4	18.0	25.0	26.7	22.6	18.3	7.1	5.6
Asian/Pacific Isl.	11.2	8.3	6.5	8.1	11.0	16.6	13.5	21.6	15.7	14.5	19.5
Black	11.1	12.8	14.8	20.9	22.5	25.9	26.3	26.6	26.1	29.1	26.4
Hispanic	7.1	7.8	9.7	10.3	14.1	15.4	15.2	15.8	16.4	15.8	17.7
White	3.3	3.9	5.0	6.1	8.5	9.5	10.5	11.2	11.7	10.2	10.3
Multiple/Unknown	3.8	8.4	12.6	10.4	10.7	15.5	8.1	12.4	13.5	14.1	14.3

Table A8. Number of Hospitalizations Related to Pregnancy and Birth among Hospitalizations with HIV/AIDS Diagnosis, California, 1988 to 2008

		Number of Hospitalizations											Total	% of Total
		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008		
MDC=14	C-Section Delivery	0	2	6	5	16	11	33	36	42	37	24	212	34.9
	Vaginal Delivery	5	4	13	19	30	21	16	37	36	21	27	229	37.7
	Postpartum Diagnoses	1	0	0	2	4	0	2	4	3	2	3	21	3.5
	Ectopic Preg./Threatened Abortion	0	0	2	1	4	0	5	1	1	2	3	19	3.1
	Abortion	1	2	1	0	4	0	0	4	6	1	1	20	3.3
	False Labor	0	0	0	0	0	1	0	1	1	0	0	3	0.5
	Antepartum Diagnoses	0	4	5	5	11	7	10	13	15	18	15	103	16.9
	Other	0	0	0	0	1	0	0	0	0	0	0	1	0.2
Total Pregnancy/Delivery Hospitalizations		7	12	27	32	70	40	66	96	104	81	73	608	100.0
MDC=15	Newborn	0	3	0	2	1	3	1	3	0	1	1	15	—

Major Diagnostic Code (MDC)

Table A9. Percentage of Persons with Diagnosis of HIV/AIDS by Characteristics of Hospitalizations, California, 1988 to 2008

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Main Payer	Medicare	5.5	7.8	11.3	17.0	23.8	29.4	32.4	31.9	32.0	33.0	33.3
	Medi-Cal	31.1	33.0	36.3	38.7	39.5	38.8	37.6	38.4	37.8	37.1	36.7
	Private Insurance	49.7	48.5	45.7	37.5	28.9	22.0	20.0	20.2	19.4	19.3	18.8
	Self-Pay	5.4	4.7	2.9	2.6	2.9	3.4	3.8	3.6	4.6	4.3	4.3
	Other Government Programs	5.1	4.0	3.3	3.8	4.1	5.4	4.6	4.6	4.5	4.7	5.1
	Other	3.3	2.1	0.5	0.5	0.9	0.9	1.6	1.3	1.8	1.8	1.8
Source of Admission	Home	54.6	50.1	47.5	44.8	38.9	35.5	31.0	26.6	24.2	23.1	21.2
	Emergency Room	40.5	44.0	45.6	47.2	52.0	54.6	59.1	63.3	66.7	68.4	70.0
	Short Term/Acute Care Hospital	3.4	4.7	5.4	6.2	6.4	6.3	6.2	6.6	6.1	5.6	6.0
	SNF/Intermediate Care Facility	0.2	0.4	0.4	0.8	0.8	1.1	1.1	1.1	1.3	0.9	0.9
	Other Facility	0.7	0.4	0.6	0.5	1.0	1.3	1.2	1.4	1.1	1.1	1.1
	Newborn	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other	0.6	0.4	0.4	0.5	0.8	1.2	1.4	1.0	0.7	0.9	0.9
Type of Admission	Emergency/Urgent	83.8	83.0	82.9	86.4	87.1	87.6	86.4	86.4	86.8	86.7	87.0
	Elective	15.9	16.8	16.9	13.4	12.8	12.4	13.3	13.5	13.1	13.2	12.9
	Newborn/Delivery	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown/Missing	0.3	0.1	0.1	0.1	0.1	0.0	0.3	0.1	0.1	0.1	0.0
Disposition	Home	70.4	64.8	63.4	60.3	60.5	65.1	66.1	66.7	64.3	66.2	65.6
	Acute Care Facility	1.3	1.7	1.9	2.0	0.6	0.8	0.8	0.8	0.8	0.7	0.6
	SNF	2.4	2.9	4.1	6.3	8.3	8.9	8.7	9.4	9.9	8.8	9.7
	Other Healthcare Facility	1.5	2.0	2.4	2.1	2.9	3.2	3.3	3.2	3.2	3.3	3.5
	Left Against Medical Advice	2.3	2.3	2.7	3.2	3.7	4.7	5.0	5.3	5.9	5.4	4.8
	Died	12.7	12.8	11.6	10.8	8.6	6.4	5.9	5.9	5.7	5.4	5.1
	Home Health Service	9.4	13.6	13.8	15.2	13.2	8.7	7.2	6.4	7.9	7.5	7.6
	Other	0.0	0.0	0.0	0.0	2.2	2.2	3.0	2.3	2.3	2.7	3.0

**Table A10. Percentage of Persons with Diagnosis of HIV/AIDS
by Main Reason for Hospitalization (Major Diagnostic Code), California, 1988 to 2008**

Major Diagnostic Code	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
HIV Infection	—	—	67.8	67.0	70.8	62.1	57.9	55.4	53.7	52.5	47.4
Mental or Drug/Alcohol Induced Mental	3.1	3.2	2.6	3.3	5.1	8.7	8.1	8.1	8.6	7.8	7.6
Circulatory System	1.7	3.0	3.5	3.7	3.0	4.0	5.0	5.9	5.4	5.8	6.4
Digestive System	7.5	6.8	4.3	3.7	3.1	3.8	4.2	4.4	4.7	5.2	5.9
Respiratory System	32.1	30.7	4.4	4.1	2.9	3.3	3.0	3.4	3.5	3.8	4.5
Nervous System	5.8	6.0	3.0	3.4	2.3	2.1	2.8	2.8	3.2	3.0	4.1
Other Diagnosis	49.8	50.3	14.4	14.7	12.6	15.9	19.0	20.0	21.0	21.8	24.2

**Table A11. Percentage of Additional Infections and
Mental/Behavioral Diagnosis by Race/Ethnicity, 1988 to 2008**

Percentage of HIV/AIDS Hospitalizations that Had at Least One Infectious Disease Comorbidity, by Race/Ethnicity

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Native American	63.6	51.6	47.7	41.7	52.0	20.0	17.8	22.6	20.0	26.2	38.9
Asian/Pacific Isl.	61.6	58.9	57.6	59.4	53.2	31.9	31.5	31.9	36.1	27.2	39.0
Black	45.5	44.8	43.1	40.7	37.7	27.2	24.7	24.3	21.1	20.9	17.9
Hispanic	49.7	50.2	49.9	53.0	48.6	34.8	33.4	30.0	31.2	28.8	26.5
White	50.0	51.7	52.2	51.2	43.7	28.2	24.0	21.5	21.7	18.8	17.7
Multiple/Unknown	53.1	45.5	42.7	51.7	44.5	23.6	24.7	22.3	27.2	23.3	19.0
Total	49.6	50.6	50.3	49.6	43.5	29.3	26.3	24.4	23.9	21.9	20.3

Percentage of HIV/AIDS Hospitalizations that Had at Least One Mental/Behavioral Disorder Comorbidity, by Race/Ethnicity

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Native American	9.1	22.6	25.0	22.9	42.0	20.0	40.0	58.5	66.7	42.9	50.0
Asian/Pacific Isl.	7.1	7.8	9.2	11.7	14.6	22.4	24.3	19.0	28.1	27.5	33.6
Black	14.5	17.9	19.8	26.5	32.6	38.8	40.8	42.8	48.9	48.6	46.2
Hispanic	7.4	8.1	8.9	13.4	17.4	22.3	26.0	27.1	32.5	34.6	34.5
White	10.1	11.3	13.8	18.7	27.5	33.8	37.2	41.8	45.1	48.0	49.4
Multiple/Unknown	5.4	8.4	18.6	14.6	29.2	56.6	32.8	39.2	45.5	45.3	44.6
Total	10.3	11.7	14.0	19.1	26.4	32.9	35.5	38.5	43.3	44.7	44.7

Table A12. Percentage of Additional Infections and Mental/Behavioral Diagnosis by Payer, 1988 to 2008

Percentage of HIV/AIDS Hospitalizations that Had at Least One Infectious Disease Comorbidity, by Payer

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Medicare	38.8	46.4	43.3	44.9	39.7	25.9	21.1	18.8	18.6	15.0	13.0
Medi-Cal	49.0	50.4	47.7	47.7	42.9	30.2	30.1	27.3	25.9	25.1	25.4
Private Insurance	50.5	52.7	55.4	55.0	49.4	32.8	26.7	25.5	25.7	23.2	20.9
Self-Pay	53.8	48.6	46.2	50.3	39.8	30.8	33.2	31.3	31.3	33.3	30.4
Other Government Program	45.7	36.6	35.6	37.6	35.5	27.8	26.7	28.4	29.5	26.4	19.2
Other	57.7	50.4	51.0	33.1	30.7	17.1	21.5	21.8	25.3	25.7	23.1
Total	49.6	50.6	50.3	49.6	43.5	29.3	26.3	24.4	23.9	21.9	20.3

Percentage of HIV/AIDS Hospitalizations that Had at Least One Mental/Behavioral Disorder Comorbidity, by Payer

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Medicare	18.0	17.7	22.9	25.9	34.7	40.3	41.4	46.0	49.4	51.3	50.5
Medi-Cal	12.4	14.9	16.9	22.4	29.2	36.7	40.1	42.7	47.7	48.0	47.1
Private Insurance	7.3	7.7	8.9	11.4	15.3	17.0	19.2	20.0	26.5	28.3	31.4
Self-Pay	12.6	11.8	14.3	23.7	24.9	31.7	31.6	37.8	39.8	41.2	41.1
Other Government Program	17.0	23.4	21.1	30.2	31.1	34.4	36.3	37.5	40.3	42.5	38.5
Other	9.2	9.2	11.4	5.8	21.1	12.5	17.6	25.5	38.1	45.2	53.0
Total	10.3	11.7	14.0	19.1	26.4	32.9	35.5	38.5	43.3	44.7	44.7

Table A13. Hospitalizations with HIV/AIDS Diagnosis That Had Additional Diagnosis, California, 1988 to 2008

Number of Hospitalizations with HIV/AIDS Diagnosis that Had Selected Additional Diagnoses											
	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Total Hospitalizations	16,139	22,776	27,546	28,585	22,835	16,690	16,459	16,529	16,002	14,876	13,874
Infectious											
Cytomegalovirus	1,365	2,930	4,893	5,294	3,421	1,152	875	648	615	471	427
Any Mycobacterial Infection	1,062	2,467	3,748	3,531	2,479	973	744	658	545	498	410
Any Toxoplasmosis Infection	644	1,062	1,024	1,098	703	313	340	252	293	271	215
Pneumocystosis	4,429	4,818	4,897	4,947	3,278	1,735	1,572	1,512	1,343	1,168	1,019
Tuberculosis: Pulmonary	3	7	4	6	0	1	3	0	0	1	0
Candidiasis	3,024	4,204	4,047	4,240	3,355	1,991	1,875	1,891	1,985	1,677	1,403
Kaposi's Sarcoma	—	—	2,441	2,310	1,434	504	320	228	219	183	158
Pneumonia: Recurrent	0	0	0	0	0	0	0	0	0	113	174
Underweight/Weight Loss	113	160	147	146	130	84	120	150	181	232	259
Mental/Behavioral											
Mental Dx: Alcohol	292	500	729	1,081	1,307	1,358	1,324	1,534	1,486	1,358	1,240
Mental Dx: Drugs	632	1,034	1,581	2,557	2,871	2,938	2,967	3,386	3,709	3,489	2,958
Mental Dx: Psychosis	319	523	803	1,133	1,381	1,646	1,787	1,950	2,153	1,997	1,948
Mental Dx: Depression	442	692	866	1,193	1,302	1,116	1,350	1,601	1,895	2,058	1,935
Mental Dx: Dementia	255	389	623	826	1,107	661	698	658	641	546	484
Percentage of Hospitalizations with HIV/AIDS Diagnosis that Had Selected Additional Diagnoses											
	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Infectious											
Cytomegalovirus	8.5	12.9	17.8	18.5	15.0	6.9	5.3	3.9	3.8	3.2	3.1
Any Mycobacterial Infection	6.6	10.8	13.6	12.4	10.9	5.8	4.5	4.0	3.4	3.3	3.0
Any Toxoplasmosis Infection	4.0	4.7	3.7	3.8	3.1	1.9	2.1	1.5	1.8	1.8	1.5
Pneumocystosis	27.4	21.2	17.8	17.3	14.4	10.4	9.6	9.1	8.4	7.9	7.3
Tuberculosis: Pulmonary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Candidiasis	18.7	18.5	14.7	14.8	14.7	11.9	11.4	11.4	12.4	11.3	10.1
Kaposi's Sarcoma	—	—	8.9	8.1	6.3	3.0	1.9	1.4	1.4	1.2	1.1
Pneumonia: Recurrent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.3
Underweight/ Weight Loss	0.7	0.7	0.5	0.5	0.6	0.5	0.7	0.9	1.1	1.6	1.9
Mental/Behavioral											
Mental Dx: Alcohol	1.8	2.2	2.6	3.8	5.7	8.1	8.0	9.3	9.3	9.1	8.9
Mental Dx: Drugs	3.9	4.5	5.7	8.9	12.6	17.6	18.0	20.5	23.2	23.5	21.3
Mental Dx: Psychosis	2.0	2.3	2.9	4.0	6.0	9.9	10.9	11.8	13.5	13.4	14.0
Mental Dx: Depression	2.7	3.0	3.1	4.2	5.7	6.7	8.2	9.7	11.8	13.8	13.9
Mental Dx: Dementia	1.6	1.7	2.3	2.9	4.8	4.0	4.2	4.0	4.0	3.7	3.5

Table A14. Percentage of HIV/AIDS Hospitalizations with Infectious Disease and/or Mental/Behavioral Disorder Comorbidities, 1988 to 2008

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Neither	44.4	42.7	41.4	38.5	39.2	45.2	46.0	45.0	41.9	41.8	43.0
Both	4.3	5.0	5.7	7.2	9.1	7.4	7.8	7.8	9.1	8.4	8.0
Infectious Only	45.3	45.6	44.6	42.4	34.4	21.9	18.5	16.5	14.8	13.5	12.3
Mental/Behavioral Only	6.1	6.7	8.3	11.9	17.3	25.5	27.7	30.7	34.2	36.3	36.7

Table A15. Risk of Having at Least One Infectious Disease Comorbidity, HIV/AIDS Hospitalizations, 1988 to 2008

Odds Ratio (Bold type indicates statistically significant P = 0.05)												
		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Race/ Ethnicity	Native American	1.80	1.04	0.96	0.74	1.57	0.60	0.58	0.99	0.90	1.26	2.41
	Asian/Pacific Isl.	1.62	1.32	1.20	1.37	1.36	1.14	1.28	1.51	1.84	1.51	2.65
	Black	0.87	0.81	0.79	0.74	0.84	1.01	0.98	1.10	0.92	1.06	0.90
	Hispanic	1.01	0.96	0.98	1.10	1.21	1.24	1.33	1.30	1.37	1.39	1.29
	Ref=White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Age	< 13 years	0.39	0.42	0.41	0.42	0.57	0.48	0.39	0.32	0.34	0.16	0.33
	13-19	0.35	0.86	0.69	0.23	0.44	0.70	0.73	0.68	0.18	0.41	0.81
	Ref=20-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	30-39	0.99	1.12	1.07	0.99	1.03	0.93	0.96	0.82	0.92	0.94	0.99
	40-49	0.97	1.05	0.99	0.96	1.01	0.73	0.67	0.70	0.68	0.78	0.76
	50-64	0.86	0.82	0.87	0.78	0.72	0.66	0.56	0.45	0.45	0.48	0.47
	65+	0.60	0.61	0.71	0.52	0.70	0.61	0.46	0.43	0.38	0.45	0.38
Gender	F vs M	NS	0.81	0.78	0.83	0.87	0.83	NS	NS	NS	NS	NS
Main Payer	Medicare	0.71	0.87	0.68	0.75	0.74	0.80	0.81	0.75	0.74	0.66	0.67
	Medi-Cal	0.97	0.97	0.80	0.84	0.82	0.95	1.19	1.09	1.01	1.07	1.28
	Ref=Private	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Self-Pay	1.16	0.87	0.71	0.88	0.69	0.90	1.22	1.21	1.13	1.41	1.45
	Other Gov.	0.88	0.58	0.50	0.58	0.63	0.81	0.96	1.10	1.15	1.08	0.83
	Other	1.37	0.90	0.90	0.41	0.45	0.41	0.70	0.80	0.88	1.01	1.04
Mental comorbidity present		0.70	0.74	0.68	0.59	0.64	0.62	0.71	0.72	0.79	0.76	0.80

Logistic Regression: Criterion for entry or retention in model P=0.05, stepwise selection. NS indicates variable did not meet criterion.

Table A16. Risk of Having at Least One Mental Disorder Comorbidity, HIV/AIDS Hospitalizations, 1988 to 2008

Odds Ratio (Bold type indicates statistically significant P = 0.05)												
		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Race/ Ethnicity	Native American	0.56	2.06	1.68	0.95	1.78	0.44	1.03	1.56	2.23	0.71	1.17
	Asian/Pacific Isl.	0.68	0.71	0.71	0.60	0.52	0.62	0.55	0.40	0.54	0.46	0.60
	Black	1.20	1.40	1.22	1.20	1.07	1.10	0.99	0.87	1.00	0.92	0.79
	Hispanic	0.63	0.61	0.53	0.59	0.52	0.55	0.56	0.48	0.55	0.56	0.53
	Ref=White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Age	< 13 years	0.00	0.02	0.01	0.00	0.05	0.08	0.17	0.03	0.06	0.18	0.37
	13-19	0.64	0.88	0.62	0.65	0.29	1.09	0.62	0.87	0.49	0.57	0.96
	Ref=20-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	30-39	1.03	1.19	1.13	1.36	1.31	1.40	1.51	1.62	1.31	1.35	1.20
	40-49	0.95	1.23	1.21	1.53	1.56	1.57	1.55	1.47	1.30	1.41	1.45
	50-64	0.81	1.07	1.23	1.15	1.22	1.13	1.38	1.28	1.08	1.25	1.25
	65+	0.34	0.54	0.41	1.03	0.79	0.84	0.88	0.67	0.65	0.67	0.68
Gender	F vs M	2.08	1.83	1.79	1.44	1.17	NS	1.25	1.29	1.22	NS	NS
Main Payer	Medicare	2.98	2.61	2.99	2.53	2.82	3.13	2.92	3.32	2.73	2.67	2.34
	Medi-Cal	1.77	2.09	2.11	2.28	2.47	3.07	3.02	3.17	2.58	2.52	2.21
	Ref=Private	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Self-Pay	1.83	1.59	1.67	2.49	1.95	2.53	2.26	2.77	2.04	2.05	1.77
	Other Gov.	2.47	3.52	2.74	3.58	2.73	2.99	2.68	2.75	2.05	2.11	1.53
	Other	1.37	1.20	1.41	0.45	1.45	0.65	0.92	1.46	1.77	2.46	2.73
Infectious comorbidity present		0.70	0.74	0.69	0.59	0.64	0.62	0.71	0.71	0.79	0.75	0.80

Logistic Regression: Criterion for entry or retention in model P=0.05, stepwise selection. NS indicates variable did not meet criterion.

Table A17. Risk of In-Hospital Death, Hospitalizations with Diagnosis of HIV/AIDS, 1988 to 2008

Odds Ratio (Bold type indicates statistically significant P = 0.05)												
		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Race/ Ethnicity	Native American	1.56	NS	NS	NS	NS	0.38	4.41	1.59	0.84	0.49	0.51
	Asian/Pacific Isl.	0.92	NS	NS	NS	NS	0.96	0.65	0.95	1.18	0.85	1.92
	Black	1.30	NS	NS	NS	NS	0.78	0.94	0.85	0.65	0.81	0.81
	Hispanic	1.28	NS	NS	NS	NS	1.04	1.14	1.21	1.24	1.34	1.08
	Ref=White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Age	< 13 years	0.72	0.61	0.30	0.65	0.54	0.35	0.70	0.37	<0.001	0.83	<0.001
	13-19	0.27	0.14	0.29	0.70	1.22	0.85	0.66	<0.001	0.38	1.08	0.38
	Ref=20-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	30-39	1.24	1.12	1.09	1.45	1.25	1.16	1.52	1.31	1.02	1.27	0.90
	40-49	1.61	1.50	1.45	1.65	1.48	1.45	1.94	1.52	1.39	1.48	1.14
	50-64	2.12	1.88	1.80	1.96	1.85	1.99	2.54	1.91	1.53	2.18	1.71
	65+	3.47	2.86	2.17	2.19	1.84	2.91	2.52	2.25	2.48	3.99	2.34
Gender	F vs M	NS	NS	NS	NS	0.78	NS	NS	NS	NS	NS	NS
Main Payer	Medicare	0.79	0.97	0.91	0.95	0.87	0.71	0.69	0.72	0.75	0.65	0.71
	Medi-Cal	1.16	1.26	1.18	1.13	1.18	1.02	0.92	1.04	1.12	1.16	1.24
	Ref=Private	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Self-Pay	1.07	1.28	1.46	1.34	1.13	1.16	0.91	1.18	1.24	1.29	1.42
	Other Gov.	1.21	0.85	0.64	0.62	0.81	0.57	0.62	0.65	0.78	0.59	0.89
	Other	1.01	0.53	0.89	0.34	0.61	0.46	0.66	0.84	0.41	1.32	0.87
Infectious comorbidity present		1.56	1.29	1.21	1.26	1.50	1.70	1.90	2.11	2.00	2.29	2.39
Mental comorbidity present		0.72	0.63	0.65	0.63	0.59	0.58	0.55	0.63	0.64	0.74	0.79
CCI Score		1.79	1.84	1.87	1.76	1.76	1.89	1.85	1.72	1.74	1.74	1.52

Logistic Regression: Criterion for entry or retention in model P=0.05, stepwise selection. NS indicates variable did not meet criterion.

Technical Notes

Data Sources. Datasets from several sources were utilized:

- Patient Discharge Data (PDD) collected by the Office of Statewide Health Planning and Development, for even-numbered years 1988 to 2008. Hospitalizations reported prior to 1988 were not used because the coding for HIV infection and AIDS was inconsistent.
- Aggregate data tables provided by the California Office of AIDS, that provided the number of persons living with HIV/AIDS for even-numbered years 1984 to 2008, broken out by age, race/ethnicity, and gender.
- Public Use Death Data, from the California Department of Public Health.
- Population estimates published by the Department of Finance, Demographic Unit.

Hospital Patients Included in Analysis and Identification of AIDS-Related Conditions.

The diagnosis codes that hospitals used for reporting HIV and AIDS evolved during the period 1986 to 2004. Hospitalizations were selected for this analysis if any of the following ICD-9 codes were reported as a principal or a secondary diagnosis: 042, 042.x, 043.x, 044.x. The principal reason

for the hospitalization may or may not have been for treatment of the HIV/AIDS. Coding for HIV and AIDS was developed in consultation with Ginger Cox, RHIT, CCS, OSHPD.

Coding for Infectious Disease and Behavioral Diagnoses.

The specific coding for AIDS-related conditions (except dementia) was adopted from Healthcare Cost and Utilization Project (HCUP) Statistical Brief #41, on hospitalizations related to HIV.⁸

Coding for Comorbidity Score. Comorbidities are diagnoses a patient has that are in addition to the main reason for the current treatment or hospitalization. The purpose of a comorbidity score is to estimate how “sick” a patient is, in addition to the primary diagnosis. It is added to the regression analysis to adjust for background severity of illness, so that the effects of age, race/ethnicity, and other factors can be understood more clearly.

The Charlson Comorbidity Index (CCI) consists of a set of serious illnesses, such as heart attack, leukemia, kidney disease, and AIDS. To obtain a patient’s score, the number of these illnesses the patient has is summed; for this report AIDS was omitted from the list of conditions that were counted for the CCI score.^{9,10}

Analysis. All data analyses were performed using SAS version 9.2. Most results are reported as frequencies, percentages, and crude

population rates. Logistic regression was used to identify independent risk factors for AIDS-related diagnoses and in-hospital death.

Limitations. The true hospitalization rates may be different from the rates reported here due to shortcomings in the reporting of cases of HIV/AIDS to state and local public health departments. In addition, the laws were changed in 2002 to require reporting cases of HIV infection as well as full AIDS. Nevertheless, the long-term trends identified in this report are likely to be valid because: (1) most of the shortcomings were consistently present during the period covered by the report and (2) the “flex points” in the trend lines happened several years before changes in the reporting laws.

Undercount. Not all HIV/AIDS cases are diagnosed and not all diagnosed cases are reported, resulting in an undercount of cases. Prior to 2002, only cases with AIDS were reported by local public health departments to the state and the number of HIV infections was estimated using methods developed by the CDC.

Overcount. The number of persons living with HIV/AIDS may be overestimated because each year some deaths are not reported to the HIV/AIDS surveillance system maintained by the Office of AIDS.

Coding. In the International Classification of Disease system version 9 (ICD-9) the single code “042” applies to human immunodeficiency virus disease, including HIV infection as well as AIDS disease, AIDS-like syndrome, and AIDS-related complex. Thus the ICD-9 coding in the hospital patient data does not distinguish between patients with HIV infection only versus AIDS disease. A second data limitation is the absence of coding to reflect how the HIV/AIDS patients were exposed to the virus.

Acknowledgements

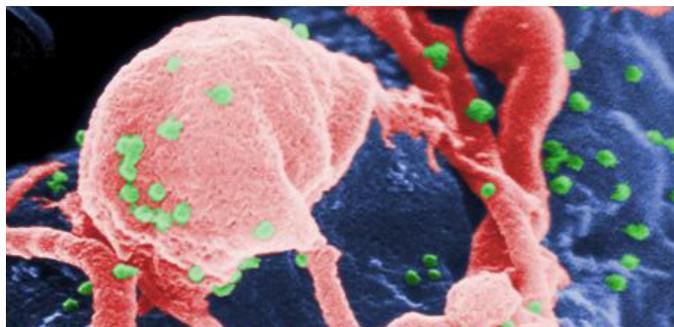
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References

- ¹ Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report, 2009. Vol. 21. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2011. <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/>.
- ² Integrated Epidemiologic Profile of HIV/AIDS in California, 2001-2005 with 2007 Update. California Department of Public Health, Office of AIDS, Sacramento, 2010. <http://www.cdph.ca.gov/programs/aids/Documents/EPIProfile.pdf>.
- ³ California Department of Public Health, Office of AIDS, HIV/AIDS Case Registry Section, data as of December 31, 2008.
- ⁴ Evolution of HIV/AIDS in California, 1981-2008. Office of AIDS, California Department of Public Health, Sacramento, 2009. <http://www.cdph.ca.gov/programs/aids/Documents/EvolutionofAIDS.pdf>.
- ⁵ The Cascade Collaboration, Survival after introduction of HAART in people with known duration of HIV-1 infection. *The Lancet*, 2000; 355(9210): 1158-59.
- ⁶ Both programs are administered by the California Department of Public Health, Office of AIDS. The AIDS Drug Assistance Program (ADAP) is funded by the state. The Ryan White Comprehensive AIDS Resources Emergency (CARE) Act authorizes the Health Insurance Premium Payment (HIPP) program. CARE/HIPP pays health insurance premiums on behalf of people disabled because of HIV and at risk of losing their health insurance coverage.
- ⁷ Castro KG, Ward JW, Slutsker L, Buehler JW, Jaffee HW, Berkelman RL. 1993 Revised Classification System for HIV Infection and Expanded Surveillance Case Definition for AIDS Among Adolescents and Adults, *MMWR*, December 18, 1992 / 41(RR-17). <http://www.cdc.gov/MMWR/preview/MMWRhtml/00018871.htm>. Patients hospitalized with these infections are probably not receiving adequate antiretroviral drug treatment.
- ⁸ Zhao Y, Encinosa W, and Hellinger F, Statistical Brief #41, HIV Hospitalizations in 1998 and 2005, AHRQ, USHHS, Washington DC, 2007; 11. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb41.pdf>.
- ⁹ Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chron Dis* 1987;40:373-83. <http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1098>.
- ¹⁰ Deyo RA, Chekin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *J Clin Epidemiol* 1992;45:613-19.



Electron microscope image of HIV, seen as small spheres on the surface of white blood cells. Courtesy of the CDC/ C. Goldsmith.



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