

Mortality in California Hospitals, 2006



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In-hospital mortality refers to deaths that occur to patients during the time they are hospitalized. This brief examines factors related to higher risk of death for hospital patients, such as age and medical diagnoses.¹ This brief includes patients who were admitted for end-of-life care, for whom mortality rates are expected to be high.

The data sources for these analyses were the Office of Statewide Health Planning and Development (OSHPD) Patient Discharge Data for 2006, which includes death certificate data for 2006 and information for all patients who were hospitalized in California during that year. The standard codes used for reporting patient diagnoses (ICD-9 Codes) were grouped into the categories defined by the Clinical Classification Software developed by the Agency for Healthcare Research and Quality (AHRQ).²

In-Hospital Mortality Rates

Approximately 37% of all deaths in California in 2006 occurred in a hospital.³ This percentage was higher for children ages 0-17 years (61%) than for middle adults ages 18-64 years (37%) and seniors 65 years and older (36%).

Nationally about 2.5% of hospital stays end in death.⁴ In California, the in-hospital mortality rate was 2.1%⁵ overall; it was highest among seniors (5%), lower for middle adults (3%) and children (0.5%). Among children

the mortality rate was twice as high for African American children (0.6%), compared with Asian/Pacific Islanders (0.3%). Among middle adults the mortality rate ranged from a low of 0.9% among Hispanics to a high of 1.4% among Native Americans. Among seniors mortality ranged from 4.6% among Hispanics to a high of 5.5% among Asian/Pacific Islanders (See Figure 1).

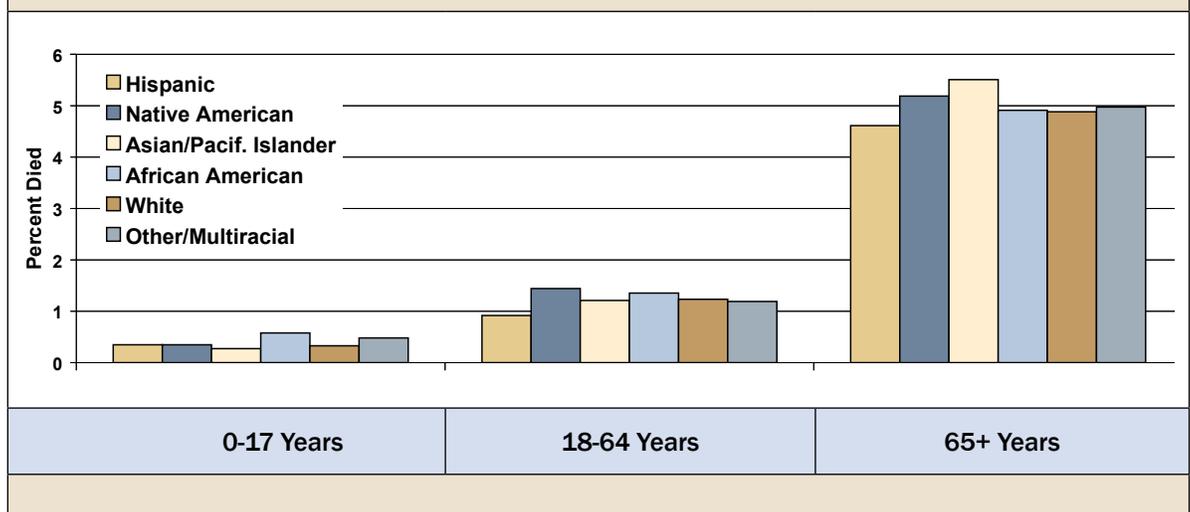
Illnesses with the highest mortality rates, by Age

The top five diagnosis categories accounted for 68.7% of children's deaths, 40.2% of middle adult deaths, and 46.4% of in-hospital deaths among seniors (See Table 1).

For children the most frequent diagnosis associated with in-hospital death was birth with extreme immaturity (including birth weight less than 1,000 gm). The other diagnoses most frequently associated with death in children were: congenital cardiovascular abnormalities, low birth weight, other perinatal conditions (e.g., respiratory failure, septicemia), and intracranial injury.

The three most frequent types of diagnosis associated with death for both middle adults and seniors were: septicemia, respiratory failure, and acute cerebrovascular disease (CVD). The other two diagnoses with the highest mortality rates were metastatic cancer and intracranial injury for middle adults and acute myocardial infarction (AMI) and pneumonia/influenza for seniors.

Figure 1. Percent of Hospital Cases with In-Hospital Death, by Age and Race/Ethnic Group, California 2006



It is the mission of the Office of Statewide Health Planning and Development (OSHPD) to provide useful information about the quality and safety of healthcare in California. As part of this mission, OSHPD presents this Research Brief addressing key information about the occurrence of in-hospital mortality among patients admitted to the hospital for care during 2006.

Table 1. Five Most Frequent Diagnoses Associated with In-Hospital Death, California Hospital Patients, 2006

Age Group	CCS Category	# Died	% All Deaths For Age Group	% With the Diagnosis Died
0-17	218 Liveborn	1,553	52.0	0.3
	224 Other perinatal conditions	142	4.8	1.3
	213 Cardiac and circulatory congenital anomalies	127	4.2	3.0
	233 Intracranial injury	122	4.1	3.9
	219 Short gestation; low birth weight; fetal growth retardation	109	3.6	3.6
	Totals for the Top 5	2,053	68.7	0.4
	Totals for Age Group	2,989	100.0	0.4
18-64	2 Septicemia (except in labor)	3,371	14.8	15.4
	131 Respiratory failure; insufficiency; arrest (adult)	1,985	8.7	16.7
	109 Acute cerebrovascular disease	1,693	7.4	9.8
	42 Secondary malignancies	1,243	5.5	10.4
	233 Intracranial injury	836	3.7	6.9
	Totals for the Top 5	9,128	40.2	12.1
	Totals for Age Group	22,726	100.0	1.2
65+	2 Septicemia (except in labor)	10,640	18.1	23.4
	131 Respiratory failure; insufficiency; arrest (adult)	5,419	9.2	26.6
	109 Acute cerebrovascular disease	4,077	6.9	11.2
	122 Pneumonia (except Tuberculosis or Sexually transmitted diseases)	4,035	6.9	6.5
	100 Acute myocardial infarction	3,115	5.3	9.3
	Totals for the Top 5	27,286	46.4	13.7
	Totals for Age Group	58,753	100.0	4.9

Table 2. In-Hospital Mortality, by End-of-Life Care Preference

	Total Cases	# Survived	# Died	% Died
Total	3,997,182	3,912,714	84,468	2.1
Both Types of Order	12,864	5,534	7,330	57.0
Palliative Care Order	9,555	4,449	5,106	53.4
DNR Order	149,182	125,365	23,817	16.0
Neither	3,825,581	3,777,366	48,215	1.3

Table 3. In-Hospital Mortality Related to Selected Medical Conditions

Type of Medical Condition	Admissions		In-Hospital Deaths		
	# of Admissions	% of All Admits	# of Deaths	% of All Deaths	% of Group Died
Septicemia	69,272	1.7	14,098	16.7	20.4
Liver Disease	24,839	0.6	2,022	2.4	8.1
Stroke	84,425	2.1	6,128	7.3	7.3
Cancer	152,110	3.8	9,489	11.2	6.2
Pneumonia & Influenza	119,444	3.0	7,733	9.2	6.5
Heart Disease	427,132	10.7	10,894	12.9	2.6
Complications of Medical Procedures & Devices	105,516	2.6	1,911	2.3	1.8
Childbirth	603,676	15.1	89	0.1	0.0
Total for Selected Conditions	1,586,414	39.7	52,364	62.0	3.3
Total for Other Principal Diagnoses	2,410,768	60.3	32,104	38.0	1.3
Total	3,997,182	100.0	84,468	100.0	2.1

End-of-Life Care Preferences

In 2006, there were 149,182 admissions with Do Not Resuscitate (DNR) orders placed in the medical record within 24 hours. There were 9,555 patients admitted for palliative care only (ICD-9 code⁶ V66.7), most of whom were admitted from hospice settings. There were 12,864 patients with both a DNR order and admission for palliative care. Patients with either a DNR order or palliative care order accounted for 42.9% of all deaths (See Table 2).

Among patients with DNR orders only, 16% died, but among patients admitted for palliative care, with or without a DNR order, the mortality rate was 3.5 times greater (53.4% - 57.0%). In comparison, only 1.3% died among patients with neither type of end-of-care preference.

Medical Conditions Associated With Higher Mortality Rates

This brief focused on the death rates for eight types of medical conditions, selected because they were associated with large numbers of hospital admissions and/or high mortality rates. Together, they accounted for 62% of all the in-hospital deaths (See Table 3).

The type of medical condition with the highest volume of deaths was septicemia, accounting for 16.7% of all in-hospital deaths. The conditions with the next highest volumes of death were heart disease and cancer, accounting for 12.9% and 11.2% of the in-hospital deaths respectively.

The admitting diagnosis associated with the highest in-hospital mortality rate was septicemia (blood infection). Of the 69,272 patients admitted with septicemia, 14,098 (20.4%) died. For more than seventy percent (10,051) of these deaths, the type of bacteria or virus was not reported. Eleven percent of

the deaths (1,531) were Staphylococcus aureus infections and almost half of these (45%) were resistant to penicillin/methicillin (MRSA).

The conditions with the next highest in-hospital mortality rates were liver disease (8.1%), stroke (7.3%), and cancer (6.2%).

Relationships between the Risk Factors for In-Hospital Death

For this brief, a statistical analysis (logistic regression) was conducted to identify important risk factors for in-hospital death. The results were the following (Table 4):

- Mortality risk was 20% greater (Odds Ratio = 1.2) for each of the race/ethnic groups when compared to Whites. For Hispanics, the risk was 10% higher.
- Patients paying for care out-of-pocket were 80% more likely to die (Odds Ratio = 1.8) and patients covered by Medi-Cal were 60% more likely to die (Odds Ratio = 1.6), compared with patients covered by private insurance.
- Patients admitted for end-of-life care were much more likely to die. Those admitted for palliative care only, such as patients in hospice, were 43 times more likely to die in-hospital. The patients receiving Do Not Resuscitate orders within 24 hours of admission were 7 times more likely to die.
- After controlling for the effects of age, payer, and end-of-life care preference, the risk of death was 8 times greater for patients admitted with septicemia (Odds Ratio = 8.1) and 2 to 5 times greater for patients admitted with liver disease, cancer, or stroke (Odds Ratios = 2.6 to 4.6).

Table 4. Logistic Regression Analysis of Risk Factors for In-Hospital Death

Risk of In-Hospital Death	Odds Ratio	95% Confidence Interval
Age (per decade)	1.3	1.2 - 1.3
Race/Ethnicity		
White	Reference group	
Other/Multiple Races	1.2	1.2 - 1.3
African American	1.2	1.2 - 1.3
Asian/Pacific Islander	1.2	1.2 - 1.3
Native American	1.2	1.0 - 1.4
Hispanic	1.1	1.1 - 1.2
End-of-Life Preference		
None	Reference group	
Both Palliative and DNR	43.1	41.5 - 44.8
Palliative Only	41.3	39.5 - 43.2
DNR Only	6.5	6.4 - 6.6
Primary Payer		
Private Insurance	Reference group	
Self-Pay	1.8	1.7 - 1.9
Other Payer	1.6	1.4 - 1.8
Medi-Cal	1.6	1.6 - 1.6
Other Indigent Program	1.5	1.3 - 1.7
Other Government	1.3	1.2 - 1.4
Medicare	1.1	1.1 - 1.2
County Indigent	0.6	0.5 - 0.6
Workers Compensation	0.5	0.4 - 0.6
Type of Condition		
Other type of condition	Reference group	
Septicemia	8.1	7.9 - 8.3
Liver Disease	4.6	4.3 - 4.8
Cancer	2.6	2.5 - 2.7
Stroke	2.6	2.5 - 2.
Pneumonia/Influenza	1.7	1.6 - 1.7
Heart Disease	1.2	1.1 - 1.2
Medical Complications	1.1	1.1 - 1.2

Acknowledgements

Research Briefs are prepared by the Healthcare Information Division of the Office of Statewide Health Planning and Development. For further information, see www.oshpd.ca.gov/HID/Products/Research_Briefs.

References and Notes

¹ For this report, only the principal diagnosis was utilized. This might or might not have been the underlying cause of death. Additional health conditions reported as secondary diagnoses in the patient records were not included in this analysis.

² For further information see the Web site for Agency for Healthcare Research and Quality, Clinical Classification Software (CCS) for ICD-9-CM at www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp.

³ Data source: California Vital Statistics, Department of Public Health, Death Statistical Master File, 2006.

⁴ Elixhauser A, Yu K, Steiner C, Bierman AS. Hospitalization in the United States, 1997. Rockville (MD): Agency for Healthcare Research and Quality; 2000. HCUP Fact Book No. 1; AHRQ Publication No. 00-0031. ISBN 1-58763-005-2.

⁵ Data source: Office of Statewide Health Planning and Development, Healthcare Information Division, Patient Discharge Data, 2006.

⁶ International Classification of Diseases, 9th Revision (ICD-9). National Center for Health Statistics, Centers for Disease Control and Prevention. See: www.cdc.gov/nchs/icd9.htm.