

May 2014

Diabetes Tied to a Third of California Hospital Stays, Driving Health Care Costs Higher

Ying-Ying Meng, Melissa C. Pickett, Susan H. Babey, Anna C. Davis, and Harold Goldstein

“Nearly one-third of hospitalized patients ages 35 and over have diabetes.”

SUMMARY: Increasing diabetes prevalence has been found to be a primary driver of increased health care costs in the United States. This policy brief examines the impact of diabetes on hospitalizations and related hospitalization costs in California. Using 2011 hospital patient discharge data and annual financial data from the Office of Statewide Health Planning and Development (OSHPD), this study found that patients with diabetes represented 31 percent of hospitalizations in California in 2011 among patients 35 years or older, including 39 percent of African-American and Asian-American

patients and 43 percent of Latino patients. Moreover, these hospitalizations cost nearly \$2,200 more per hospitalization than those for patients without diabetes, regardless of the primary reason for the hospitalization. Given that approximately 90-95 percent of diagnosed diabetes among adults is type 2 diabetes and is therefore preventable, public health measures can and should be taken to relieve the burden of type 2 diabetes. Such measures include promoting a healthy diet and regular physical activity and providing adequate access to primary and specialty care.

Between 1980 and 2010, the number of people with diabetes in the United States more than tripled, from 5.6 million to 20.9 million.¹ In the 10-year period from 1999 to 2008, the prevalence of diabetes and pre-diabetes among adolescents in the U.S. rose dramatically, from 9 percent to 23 percent.² California is not excluded from the growing national diabetes epidemic. According to the California Health Interview Survey (CHIS), more than 2.3 million California adults had diabetes (8.4 percent) in 2011-2012. This represents a 35 percent increase from the prevalence just 10 years earlier. While diabetes is steadily increasing among California's general population, research suggests that patients with diabetes are disproportionately represented among adults who are hospitalized, contributing to increasing health care costs.³

Diabetes is taking a heavy toll on America's health and finances. The disease cost the United States an estimated \$245 billion in 2012, with \$176 billion in direct medical care costs and \$69 billion in indirect costs, such as lost productivity.⁴ Average medical expenditures for people with diabetes are 2.3 times higher than for those without diabetes.⁴ Diabetes is known to cause a number of serious complications, including blindness, kidney disease, cardiovascular disease, and limb disease severe enough to require amputation; some complications can even lead to death. In 2006, it was estimated that 60 percent of people with diabetes in the United States had one or more complications from the condition, with treatment for diabetes-related complications costing an estimated \$22.9 billion.⁵ Approximately 90-95 percent of diagnosed diabetes among



This policy brief was developed in collaboration with the California Center for Public Health Advocacy.

“Hospital stays for patients with diabetes cost nearly \$2,200 more than for patients without diabetes.”

adults is type 2 diabetes. Empirical evidence shows that both onset and complications of type 2 diabetes can be prevented.⁶

This policy brief, produced by the UCLA Center for Health Policy Research and the California Center for Public Health Advocacy with funding from the California Endowment, examines the percentage of hospitalized patients with diabetes in California. Data on the prevalence of diabetes among California adults are included to provide context for the hospitalization data. The findings presented are based on the Office of Statewide Health Planning and Development (OSHPD) patient discharge data and annual financial data from public use files for 2011, as well as on data from CHIS 2011-2012. Though both data sets are representative of the California population, with location variables based on patients' residences, CHIS represents the noninstitutionalized population, while OSHPD represents the hospitalized population.

Nearly One-Third of Hospitalized Patients 35 and Older Have Diabetes

In 2011, there were 2.4 million hospitalizations in California. Based on OSHPD 2011 data, nearly one-third (31.0 percent) of hospitalizations, or roughly 729,000 hospitalizations, among Californians ages 35 and over were for individuals with a diabetes diagnosis. In comparison, CHIS data indicate that 11.6 percent of Californians 35 or older had diabetes as of 2012. If all adults ages 18 and older had been included in the study population, the percent of hospitalized patients with diabetes would have been 23.9 percent. Diabetes is often not the primary reason given for a patient's hospitalization, as only 1.7 percent of hospital records in

OSHPD 2011 listed diabetes as the primary diagnosis for the hospitalization. However, diabetes may exacerbate other conditions, leading to hospitalizations for other conditions.⁷

Hospitalization Costs Are Greater for People with Diabetes

Diabetes is not only common among hospitalized patients, but it is also very costly. In 2011, a total of \$35 billion in hospital charges was reported by hospitals in the state, excluding Kaiser Permanente facilities. Thirty-three percent of that, or \$11.6 billion, was spent to pay for hospitalizations for people who had a diabetes diagnosis, whether or not it was the primary reason for their hospital visit. This figure does not include the added cost of the more than 300,000 Kaiser members' hospitalizations, whose cost data are not available through OSHPD. Under the assumption that the average cost of Kaiser member hospitalizations is similar to the cost of non-Kaiser hospitalizations, the total amount spent in 2011 on hospitalizations for patients in California who had diabetes totaled nearly \$17.3 billion.

The average cost of a hospital visit for a patient with diabetes was \$18,691, while the average cost of a hospital visit for a patient without diabetes was \$16,492. This means that on average, hospital stays for patients with diabetes cost nearly \$2,200 more per stay than those for patients without diabetes, regardless of the patient's primary diagnosis. These results are supported by previous findings from a 2008 study by the Agency for Healthcare Research and Quality (AHRQ) using national data.³ Hospitalized patients who have diabetes may need an increased level of care, which leads to increased hospitalization costs.⁷⁻⁹

Percentage of Hospitalizations for Patients with Diabetes and Statewide Prevalence of Diabetes by Race/Ethnicity (Age 35 or Older)

Exhibit 1

Racial/Ethnic Group	Percentage of Hospitalizations for Patients with Diabetes [†]	Number of Discharges for Patients with Diabetes [†]	Prevalence of Diabetes*
White	27.5%	288,438	9.2%
Latino	43.2%	140,176	14.7%
Asian-American & Pacific Islander	38.7%	44,262	10.5%
African-American	39.3%	52,484	15.9%
American Indian & Alaska Native	40.3%	882	17.7%
Other	37.7%	13,779	15.9%

* Data Source: 2011-12 California Health Interview Survey

† Data Source: Office of Statewide Health and Planning Development, 2011; data for Alpine, Del Norte, Inyo, Mariposa, Modoc, Mono, Plumas, and Sierra counties are not included, either because data were not available or no hospitals in the county met the inclusion criteria.

Note: Patients whose racial/ethnic designations are not known are not shown in the table. The racial/ethnic designation may be considered unknown if it was not noted in the patient's records, or if the racial/ethnic designation was removed from the data set to protect patient anonymity.

Racial/Ethnic Disparities in the Burden of Diabetes

While the majority of hospitalized people with diabetes are white (n=288,438), a disproportionately heavy burden from this disease continues to be shouldered by other racial and ethnic groups. The percentage of hospitalizations for adults with diabetes statewide in 2011 was already high, at 31.0 percent, but the figure was even greater for every racial/ethnic group other than whites. Compared to the percentage of hospitalizations for white adults with diabetes (27.5 percent), the percentages of hospitalizations for other patients with diabetes were 43.2 percent among Latinos, 39.3 percent among African-Americans, 40.3 percent among American Indian/Alaska Natives, and 38.7 percent among Asian-Americans/Pacific Islanders.

In general, the disparities seen in the burden of diabetes in the hospitalized population are mirrored in the diabetes prevalence in the general population. However, the percentage of hospitalized patients who have diabetes in each racial/ethnic group is higher than the prevalence of diabetes among racial/ethnic

groups in the general population (range: 9.2 percent to 17.7 percent; Exhibit 1).

Diabetes Hospitalizations and Prevalence Vary by County

The percentage of hospitalizations for patients with diabetes varies by county, with the highest percentage found in Imperial County (41.0 percent) and the lowest in Nevada County (19.9 percent), as shown in Exhibit 2. In addition to Imperial County, the counties with the highest percentages of hospitalized patients with diabetes are Solano (36.2 percent), Yuba (35.7 percent), Merced (35.7 percent), and Fresno (35.1 percent).

Based on CHIS 2011-2012 data, diabetes prevalence is also seen to vary by county (Exhibit 2). California county populations vary with respect to age, gender, race and ethnicity, education, income, insurance status, health status, and obesity rates. These differences likely contribute to the variation in diabetes prevalence and percentages of hospitalizations for patients who have diabetes.

“Latino, African-American and other non-white racial and ethnic groups who are hospitalized are more likely to have diabetes.”

Exhibit 2

Percentage of Hospitalizations for Patients with Diabetes and Prevalence of Diabetes by California County

	Percentage of Hospitalizations for Patients with Diabetes†	Number of Discharges for Patients with Diabetes†	Prevalence of Diabetes*
Total Discharges (n=2,352,570)	31.0%	729,314**	11.6%
Northern and Sierra Counties			
Butte	27.5%	6,221	12.6%
Shasta	26.1%	4,469	12.2%
Humboldt	25.4%	2,090	12.6%
Del Norte, Siskiyou, Lassen, Trinity, Modoc, Plumas, Sierra	25.9%	1,208	10.8%
Mendocino	25.5%	1,668	7.3%
Lake	27.1%	1,960	10.7%*
Tehama, Glenn, Colusa	27.5%	1,716	11.0%
Sutter	32.8%	2,097	16.1%
Yuba	35.7%	1,867	17.5%
Nevada	19.9%	1,460	5.4%
Tuolumne, Calaveras, Amador, Inyo, Mariposa, Mono, Alpine	23.5%	2,840	9.4%
Greater Bay Area			
Santa Clara	31.0%	26,610	10.0%
Alameda	31.8%	28,311	8.9%
Contra Costa	31.5%	20,820	10.6%
San Francisco	26.7%	13,993	7.1%
San Mateo	29.0%	11,096	10.6%
Sonoma	25.9%	7,459	6.7%
Solano	36.2%	8,168	12.1%
Marin	20.0%	3,233	5.0%
Napa	30.2%	3,126	10.0%
Sacramento Area			
Sacramento	34.5%	27,249	13.7%
Placer	24.4%	4,140	9.9%
Yolo	30.8%	2,640	12.3%
El Dorado	23.3%	2,419	7.8%
San Joaquin Valley			
Fresno	35.1%	19,198	12.8%
Kern	31.9%	17,427	12.9%
San Joaquin	33.6%	14,085	14.0%
Stanislaus	34.3%	12,203	16.9%
Tulare	34.4%	9,322	20.6%
Merced	35.7%	5,259	19.4%
Kings	29.3%	1,238	17.0%
Madera	33.3%	2,862	19.8%
Central Coast			
Ventura	28.3%	14,571	10.4%
Santa Barbara	25.5%	5,708	8.1%
Santa Cruz	25.1%	3,879	7.9%
San Luis Obispo	23.0%	3,823	9.0%
Monterey	30.5%	6,689	14.4%
San Benito	26.5%	922	16.9%*
Los Angeles			
Los Angeles	33.1%	223,512	12.5%
Other Southern California			
Orange	29.2%	49,543	9.9%
San Diego	29.2%	54,595	10.4%
San Bernardino	33.6%	42,367	15.2%
Riverside	30.4%	40,727	12.0%
Imperial	40.1%	4,324	8.5%

* Data Source: 2011-12 California Health Interview Survey

† Data Source: Office of Statewide Health and Planning Development, 2011; data for Alpine, Del Norte, Inyo, Mariposa, Modoc, Mono, Plumas, and Sierra counties are not included, either because data were not available or no hospitals in the county met the inclusion criteria.

** The state total includes some patients whose counties were not identified in the data source.

Note: CHIS represents the noninstitutionalized population, while OSHPD represents the hospitalized population. As the data sets have distinct methodologies, caution should be exercised when making comparisons between populations.

Majority of Hospitalizations for Californians with Diabetes Paid for by Public Insurance

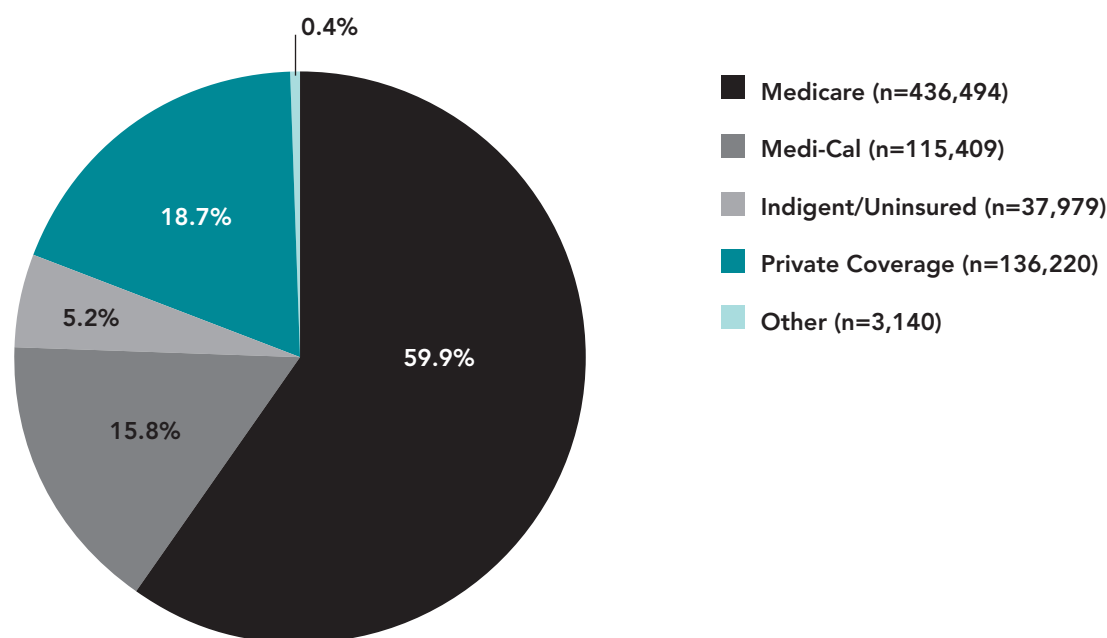
The majority of hospital stays for patients with diabetes are covered by public insurance. As shown in Exhibit 3, government-funded Medicare and Medi-Cal paid for more than 550,000 hospitalizations, or approximately three-quarters of hospitalizations, for patients with diabetes in California in 2011. Three-fifths (59.9 percent) of hospitalizations for patients who had diabetes were covered by Medicare, and another 15.8 percent and 5.2 percent were covered by Medi-Cal or indigent/uninsured care, respectively. More than half (57.5 percent) of hospitalizations for patients who had diabetes were among adults 65 or older; the remaining 42.5 percent were for patients ages 35–64.

Summary and Policy Implications

Diabetes is taking a heavy toll on California's health care and financial systems. The profound burden of diabetes among the hospitalized population in California suggests that more effort is needed to address the incidence and prevalence of diabetes statewide. For example, maintaining a healthy weight, consuming healthy foods and beverages, limiting sugar intake, and exercising regularly all reduce one's risk of developing or increasing the severity of type 2 diabetes. Taking appropriate medications can delay or control diabetes complications. Therefore, actions should be taken to encourage early adoption of these healthy habits and to increase access to appropriate care to decrease diabetes prevalence and complications, as well as subsequent related

Statewide Percentages of Hospitalizations for Patients with Diabetes (Age 35 or Older), by Payer Source

Exhibit 3



Data Source: Office of Statewide Health and Planning Development, 2011. Data for Alpine, Del Norte, Inyo, Mariposa, Modoc, Mono, Plumas, and Sierra counties are not included, either because data were not available or no hospitals in the county met the inclusion criteria.

“Lack of health insurance or sufficient benefit packages creates significant financial barriers to accessing primary and specialty care services.”

health care costs. Policymakers could consider the following options:

- **Promoting appropriate management of diabetes.** Diabetes care guidelines and health care provider oversight, along with self-management education, can help providers and patients to better manage and control diabetes through better control of blood sugar, blood pressure, and cholesterol; regular foot exams; dilated eye exams; smoking cessation; and weight loss, thus preventing costly hospitalizations for patients with diabetes due to complications.
- **Promoting adequate access to quality primary and specialty care.** At-risk individuals need to have adequate and sufficient access to quality primary and specialty care services. Lack of continuous health insurance coverage or sufficient benefit packages creates significant financial barriers to accessing primary and specialty care services. Having a medical home where a relationship with a provider and health care team can be established will also be essential to managing diabetes in primary and specialty care settings.
- **Promoting environments that encourage healthy eating.** Improving the food and beverage environment through expansion of access to fruits and vegetables, local area planning to increase the presence of supermarkets in inner-city areas with a paucity of consumer options, developing educational strategies to assist consumers in making more informed food and beverage choices, and ensuring the availability of safe and low-cost drinking water can all be addressed through local and state policy initiatives.

- **Promoting built environments that encourage regular physical activity.** Lack of physical activity is a significant risk factor for diabetes and obesity, and further policies should be developed to facilitate active living—for example, creating safe environments for walking and biking, providing access to safe parks and other places for recreation and physical activity, and offering worksite programs to facilitate regular physical activity for adults of all ages.

Data Sources and Methods

This policy brief examines the prevalence of diabetes among hospitalizations in California using Office of Statewide Health Planning and Development (OSHPD) patient discharge data and annual financial data from public use files for 2011, and the prevalence of diabetes in California using data from the 2011–2012 California Health Interview Survey (CHIS). OSHPD provides public data sets of inpatient data collected from licensed California hospitals. Hospitalized patients were identified as having diabetes if any one of the up to 25 ICD-9 diagnosis codes in their discharge records was related to diabetes, as defined by the Healthcare Cost and Utilization Project (HCUP) under the Agency for Healthcare Research and Quality (AHRQ). Psychiatric and children’s hospitals and discharges from beds that are licensed as beds for psychiatric or chemical dependency treatment were excluded from the analyses.

We should note that our methodology likely results in an underestimate of diabetes prevalence among hospitalizations, because it is likely that doctors do not always note a diagnosis of diabetes for some hospitalized patients who nevertheless have the condition. Cost estimates were derived using patient charges from OSHPD Quarterly Financial Data for 2011. Charges were converted to cost estimates using OSHPD’s cost-to-charge ratio* for each individual hospital. It should be noted that these cost data are only estimates, reflecting the amounts that were likely paid by insurers or other payers.



This publication contains data from the California Health Interview Survey (CHIS), the nation’s largest state health survey. Conducted by the UCLA Center for Health Policy Research, CHIS data give a detailed picture of the health and health care needs of California’s large and diverse population. Learn more at: www.chis.ucla.edu

* (Total Operating Expenses - Other Operating Revenue) ÷ Total Gross Patient Revenue

CHIS is a two-stage, geographically stratified random-digit-dial (RDD) telephone survey that has been conducted biannually among California's non-institutionalized population since 2001. CHIS 2011-2012 interviews were conducted from June 2011 to January 2013. The interviews were conducted in one of five languages: English, Spanish, Chinese (Mandarin and Cantonese dialects), Vietnamese, or Korean. CHIS 2011-2012 interviewed approximately 43,000 adults ages 18 and older. Respondents who answered "Yes" to the question "Other than during pregnancy, has a doctor ever told you that you have diabetes or sugar diabetes?" were counted as having diabetes.

Author Information

Ying-Ying Meng, DrPh, is a senior research scientist and co-director of the Chronic Disease Program at the UCLA Center for Health Policy Research. Melissa C. Pickett, MPH, is a research associate at the UCLA Center for Health Policy Research. Susan H. Babey, PhD, is a senior research scientist and co-director of the Chronic Disease Program at the UCLA Center for Health Policy Research. Anna C. Davis, MPH, is a graduate student researcher at the UCLA Center for Health Policy Research. Harold Goldstein, DrPH, is executive director of the California Center for Public Health Advocacy.

Acknowledgments

The authors wish to thank Julie Williamson, Rosa Soto, and Mike Miller for their collaborative efforts. The authors would also like to thank the following individuals for their helpful contributions: Francine R. Kaufman, MD, Distinguished Professor Emerita of Pediatrics at USC, the Center for Endocrinology, Diabetes and Metabolism, Children's Hospital Los Angeles; Kimberly Narain, MD, MPH, Specialty Training Advanced Research Fellow, UCLA Division of General Internal Medicine and Health Services Research; Carl Stevens, MD, MPH, FACEP, Director of Process and Quality Improvement Program, Harbor-UCLA Department of Emergency Medicine; and David Zingmond, MD, PhD, Assistant Professor of Medicine, UCLA David Geffen School of Medicine.

Funding

Support for this policy brief was provided by a grant from The California Endowment to the California Center for Public Health Advocacy.

Suggested Citation

Meng YY, Pickett MC, Babey SH, Davis AC, Goldstein H. *Diabetes Tied to a Third of California Hospital Stays, Driving Health Care Costs Higher*. UCLA Center for Health Policy Research and California Center for Public Health Advocacy, 2014.

Endnotes

- Centers for Disease Control and Prevention. Number (in Millions) of Civilian, Noninstitutionalized Persons with Diagnosed Diabetes, United States, 1980–2010. 2011. <http://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm>. Accessed February 4, 2014.
- May AL, Kuklina EV, Yoon PW. Prevalence of Cardiovascular Disease Risk Factors Among U.S. Adolescents, 1999–2008. *Pediatrics* 129(6) (2012): 1035-1041.
- Fraze TK, Jiang HJ, Burgess J. *Hospital Stays for Patients with Diabetes, 2008*. HCUP Statistical Brief No. 93. August 2010. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb93.pdf>
- American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2012. *Diabetes Care*. 36(4) (2013): 1033-1046.
- American Association of Clinical Endocrinologists. *State of Diabetes Complications in America*. 2007.
- Centers for Disease Control and Prevention. 2011 National Diabetes Fact Sheet, 2011. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf. Accessed March 16, 2011.
- Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in Older Adults. *Diabetes Care* 35 (12) (2012): 2650-2664.
- American Diabetes Association. Hospital Admission Guidelines for Diabetes. *Diabetes Care* 36 (4) (2013).
- Struijs JN, Baan CA, Schellevis FG, Westert GP, van den Bos GA. Comorbidity in Patients with Diabetes Mellitus: Impact on Medical Health Care Utilization. *BMC Health Services Research*. 6(1) (2006): 84.

10960 Wilshire Blvd., Suite 1550
Los Angeles, California 90024



The UCLA Center
for Health Policy Research
is affiliated with the
UCLA Fielding School of Public Health and
the UCLA Luskin School of Public Affairs.

The analyses, interpretations, conclusions,
and views expressed in this policy brief are
those of the authors and do not necessarily
represent the UCLA Center for Health Policy
Research, the Regents of the University
of California, or collaborating
organizations or funders.

PB2014-3

Copyright © 2014 by the Regents of the
University of California. All Rights Reserved.

Editor-in-Chief: Gerald F. Kominski, PhD

Phone: 310-794-0909
Fax: 310-794-2686
Email: chpr@ucla.edu
www.healthpolicy.ucla.edu



Read this publication online