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Hospital Stays Involving Chronic Pulmonary Heart Disease, 2005

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Introduction

Chronic pulmonary heart disease, or pulmonary hypertension, is a serious cardiac disorder most often caused by lung disease. While almost any chronic lung disease can cause it, the most common cause is chronic obstructive pulmonary disease (COPD), chronic bronchitis or emphysema. The underlying condition causes vascular congestion, increased pulmonary pressure, decreased cardiac output, and can eventually lead to heart failure. It is important to treat the underlying disease in order to prevent pulmonary heart disease, because once it occurs, it may no longer be reversible by treating the underlying disease.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on hospital stays associated with chronic pulmonary heart disease in 2005. Specifically, this report compares pulmonary heart disease-related hospitalizations to all hospital stays and discusses trends in utilization, cost, and expected payer characteristics. Additionally, it provides information about the most common reasons why patients with pulmonary heart disease as a secondary condition are admitted to the hospital and the impact of pulmonary heart disease on congestive heart failure (CHF) patients. All differences between estimates provided in the text are statistically significant at the 0.05 level or better.

Findings

In 2005, there were 456,500 hospitalizations that were associated with pulmonary heart disease—an increase of more than 50 percent from 1997, when there were 301,400 pulmonary heart disease-related stays (figure 1). In the vast majority of these cases, pulmonary heart disease was recorded as a secondary condition to a cardiovascular or pulmonary hospitalization rather than a patient's principal reason for admission. Because pulmonary heart disease is more commonly a contributing cause for hospitalizations, statistics provided in this brief are based on all-listed diagnoses rather than solely the principal diagnosis (unless otherwise noted).

In general, hospital stays related to pulmonary heart disease were longer, more costly, originated in the emergency department (ED) more often, and resulted in death more frequently when compared to hospital stays for all conditions

Highlights

- The number of pulmonary heart disease-related hospital stays increased by more than 50 percent from 1997 to 2005—from 301,400 to 456,500 stays.
- The average hospital cost for pulmonary heart disease-related stays in 2005 was about $4,300 higher than the average cost for all hospital stays ($12,400 compared to $8,100) and the average length of stay (ALOS) was nearly two days longer (6.4 days compared to 4.6 days).
- Pulmonary heart disease was recorded in about 20,000 in-hospital deaths. The in-hospital mortality rate for patients with pulmonary heart disease was more than 2 times greater than for all patients (4.4 percent compared to 2.1 percent).
- The mean age for patients hospitalized with pulmonary heart disease was 69 years.
- Government insurance programs bore the largest burden of pulmonary heart disease-related care. Medicare was billed for more than 70 percent of stays and Medicaid's share was about 8 percent.
- Heart conditions were recorded as the principal reason for admission in 7 of 10 stays that included pulmonary heart disease; 3 in 10 pulmonary heart disease-related stays were for pulmonary disease.
- More than 1 in 5 pulmonary heart disease-related stays were for treatment of congestive heart failure (CHF). When pulmonary heart disease was present, CHF stays were about $1,000 more expensive and required a longer length of stay than when there was no pulmonary heart disease diagnosis (6.0 days compared to 5.3 days).

(table 1). In 2005, the average hospital cost for pulmonary heart disease-related stays was about $4,300 higher than the average cost for all hospital stays ($12,400 compared to $8,100) and the average length of stay (ALOS) was nearly two days longer (6.4 days compared to 4.6 days). Additionally, about 40 percent more pulmonary heart disease-related stays originated in the emergency department (60.1 percent versus 42.5 percent) and the in-hospital death rate for patients with pulmonary heart disease was more than 2 times greater than for all patients (4.4 percent versus 2.1 percent) being cited in about 20,000 in-hospital deaths. It is important to note that these deaths may not necessarily have been caused by pulmonary heart disease, but may simply indicate severe underlying disease.

In terms of demographic characteristics, women and elderly individuals comprised a large portion of stays that involved pulmonary heart disease. Similar to their proportion of all hospitalizations, women accounted for about 6 in 10 pulmonary heart disease-related stays, but the average age for patients hospitalized with pulmonary heart disease was much greater than the overall patient population, surpassing it by over 20 years (mean age of 69 years compared to 47 years).

Differences in hospitalizations, by payer
Government health insurance programs, Medicare and Medicaid, bore the largest burden of pulmonary heart disease-related hospital stays (figure 2). Collectively, these two insurance programs were billed for about 8 in 10 hospital stays associated with pulmonary heart disease. Medicare's high share of hospital charges is expected given that this illness afflicts an older population. In 2005, Medicare was billed for more than 70 percent of these stays, and Medicaid's share was about 8 percent. Of the remaining pulmonary heart disease-related stays, private insurance was billed for 16 percent and other insurance programs, such as Worker's Compensation and TRICARE, were billed for about 1.5 percent. Uninsured patients were responsible for about 2 percent of pulmonary heart disease-related stays. This was in contrast to overall hospital billing patterns for all conditions where Medicare and private insurance each were accountable for over a third of stays, Medicaid for 20 percent, other insurance programs for about 3 percent, and 5.6 percent of stays were uninsured.

Most common conditions that were complicated by pulmonary heart disease
Across the years, pulmonary heart disease was predominantly a secondary diagnosis, that is, the majority of all hospital stays involving pulmonary heart disease were for other conditions chiefly responsible for the patient's admission to the hospital (table 2). From 1997 to 2005, heart conditions were recorded as the principal reason for admission in 7 of the 10 stays that noted pulmonary heart disease as a secondary condition. Respiratory conditions were the principal reason in 3 out of 10 pulmonary heart disease-related stays. In 2005, the largest share of pulmonary heart disease-related stays were for treatment of congestive heart failure (21.0 percent) followed by chronic obstructive pulmonary disease (COPD) (7.9 percent), and pneumonia (6.7 percent)—this pattern is comparable to previous years.

Impact of pulmonary heart disease on congestive heart failure hospitalizations
More than 20 percent of stays where pulmonary heart disease was recorded as a secondary condition were for treatment of congestive heart failure (CHF). About 9 percent of all CHF stays were complicated by pulmonary heart disease. When compared to CHF stays without pulmonary heart disease, CHF stays with pulmonary heart disease were more resource intensive (table 3). On average, these stays were about $1,000 more expensive ($10,500 compared to $9,700) and required longer hospital stays (6.0 days versus 5.3 days). Also, among patients with CHF, women were more likely than men to have pulmonary heart disease (58.3 percent of women versus 41.7 percent of men). However, other characteristics of CHF hospitalizations, such as the mean patient age, percent admitted from the ED, and in-hospital mortality rate, did not vary significantly with the presence of pulmonary heart disease.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2005 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1997 through 2004 NIS.

Definitions

Diagnoses, ICD-9-CM, and Clinical Classifications Software (CCS)
The principal diagnosis is that condition established after study to be chiefly responsible for the patient's admission to the hospital. Secondary diagnoses are concomitant conditions that coexist at the time of admission or that develop during the stay. All-listed diagnoses include the principal diagnosis plus these additional secondary conditions.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 12,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses into 260 clinically meaningful categories.[1] This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

Case Definition
The ICD-9-CM codes defining pulmonary heart disease include diagnosis codes in the following range:

– 416.0: Primary Pulmonary Hypertension
– 416.1: Kyphoscoliotic Heart Disease
– 416.8: Chronic Pulmonary Heart Disease
– 416.9: Chronic Pulmonary Heart Disease Not Otherwise Specified (NOS)

This definition of pulmonary heart disease is the same as was used in a CDC report[2] on pulmonary hypertension, with the addition of 416.1, which was retained in this report to be comprehensive of all chronic pulmonary heart disease. However, 416.1 is extremely rare, contributing fewer than 100 cases to the estimates presented here. The numbers of cases differ substantially from the CDC study, which reported 260,000 hospital stays in 2002 compared to 389,800 stays in the HCUP NIS database. A likely cause of this discrepancy may be that the data source used for the CDC report (the National Hospital Discharge Survey) provides up to 7 diagnosis fields while the Nationwide Inpatient Sample used for this report provides up to 15 diagnosis fields. With a condition that is generally a secondary diagnosis in complicated patients, the additional diagnosis fields may add critical information.

Types of hospitals included in HCUP
HCUP is based on data from community hospitals, defined as short-term, non-Federal, general and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include OB-GYN, ENT, orthopedic, cancer, pediatric, public, and academic medical hospitals. They exclude long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals, but these types of discharges are included if they are from community hospitals.

Unit of analysis
The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate "discharge" from the hospital.

Costs and charges
Total hospital charges were converted to costs using HCUP cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).[3] Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used because detailed charges are not available across all HCUP States. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. All costs are reported to the nearest hundred.

Payer
Payer is the expected payer for the hospital stay. To make coding uniform across all HCUP data sources, Payer combines detailed categories into more general groups:

- Medicare includes fee-for-service and managed care Medicare patients.
- Medicaid includes fee-for-service and managed care Medicaid patients. Patients covered by the State Children's Health Insurance Program (SCHIP) may be included here. Because most state data do not identify SCHIP patients specifically, it is not possible to present this information separately.
- Private insurance includes Blue Cross, commercial carriers, and private HMOs and PPOs.

[1]HCUP CCS. Healthcare Cost and Utilization Project (HCUP). August 2006. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp
[2] Hyduk A, Croft JB, Ayala C, Zheng K, Zheng ZJ, Mensah JA. Pulmonary Hypertension Surveillance – United States, 1988-2002. Morbidity and Mortality Weekly Report, 2005; 54 (SS05): 1-28. http://www.cdc.gov/MMWR/preview/mmwrhtml/ss5405a1.htm
[3]HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2004. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp.

- Other includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government and non-government programs.
- Uninsured includes an insurance status of "self-pay" and "no charge."

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

Admission source
Admission source indicates where the patient was located prior to admission to the hospital. Emergency admission indicates the patient was admitted to the hospital through the emergency department.

Discharge status
Discharge status indicates the disposition of the patient at discharge from the hospital, and includes the following six categories: routine (to home), transfer to another short-term hospital, other transfers (including skilled nursing facility, intermediate care, and another type of facility such as a nursing home), home health care, against medical advice (AMA), or died in the hospital.

About HCUP

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Arizona Department of Health Services
Arkansas Department of Health & Human Services
California Office of Statewide Health Planning & Development
Colorado Health & Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia GHA: An Association of Hospitals & Health Systems
Hawaii Health Information Corporation
Illinois Health Care Cost Containment Council and Department of Public Health
Indiana Hospital & Health Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Maryland Health Services Cost Review Commission
Massachusetts Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
Missouri Hospital Industry Data Institute
Nebraska Hospital Association
Nevada Division of Health Care Financing and Policy, Department of Human Resources
New Hampshire Department of Health & Human Services
New Jersey Department of Health & Senior Services
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oklahoma Health Care Information Center for Health Statistics
Oregon Association of Hospitals and Health Systems
Rhode Island Department of Health
South Carolina State Budget & Control Board
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services

Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health & Family Services

About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising about 90 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system, allowing for tables and graphs to be generated on national and regional statistics, as well as trends for community hospitals in the U.S. HCUPnet generates statistics using data from HCUP's Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the State Inpatient Databases (SID) and the State Emergency Department Databases (SEDD).

For More Information

For more information about HCUP, visit www.hcup-us.ahrq.gov.

For additional HCUP statistics, visit HCUPnet, our interactive query system, at www.hcup.ahrq.gov.

For information on other hospitalizations in the U.S., download *HCUP Facts and Figures: Statistics on Hospital-based Care in the United States in 2005*, located at http://www.hcup-us.ahrq.gov/reports.jsp.

For a detailed description of HCUP, more information on the design of the NIS, and methods to calculate estimates, please refer to the following publications:

Steiner, C., Elixhauser, A., Schnaier, J. The Healthcare Cost and Utilization Project: An Overview. *Effective Clinical Practice* 5(3):143–51, 2002.

Design of the HCUP Nationwide Inpatient Sample, 2005. Online. June 13, 2007. U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2005_Design_Report.pdf

Houchens, R., Elixhauser, A. *Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001*. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf

Houchens RL, Elixhauser A. *Using the HCUP Nationwide Inpatient Sample to Estimate Trends. (Updated for 1988-2004)*. HCUP Methods Series Report #2006-05 Online. August 18, 2006. U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/reports/2006_05_NISTrendsReport_1988-2004.pdf

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http://www.hcup-us.ahrq.gov/reports/statbriefs/sb43.pdf

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

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Table 1. Characteristics of hospitalizations involving pulmonary heart disease compared to all hospital stays, 2005

	Stays that included a pulmonary heart disease diagnosis			All hospital stays
	All pulmonary heart disease-related stays	**Stays with pulmonary heart disease as a principal diagnosis**	**Stays with pulmonary heart disease as a secondary diagnosis***	
Number of hospital stays (percent of all hospital stays)	456,500 (1.2%)	15,200 (.04%)	441,300 (1.1%)	39.2 million (100.0%)
Mean cost per stay, dollars	$12,400	$11,100	$12,400	$8,100
Aggregate cost, dollars	$5.6 billion	$165.6 million	$5.4 billion	$316.3 billion
Mean length of stay, days	6.4 days	6.1 days	6.5 days	4.6 days
Percentage of admissions for females	60.6%	66.7%	60.4%	58.7%
Mean age	69 years	60 years	70 years	47 years
Percentage admitted through the Emergency Department (ED)	60.1%	53.2%	60.4%	42.5%
Percentage of hospital stays in which the patient died in the hospital	4.4%	5.6%	4.3%	2.1%

*Excludes stays during which pulmonary heart disease was also recorded as a principal diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2005.

Table 2. Top 10 conditions reported as the principal diagnosis on hospital records with pulmonary heart disease recorded as a secondary diagnosis, 1997, 2001, & 2005

Number of stays for selected condition that included pulmonary heart disease as a secondary diagnosis (Percentage of secondary pulmonary heart disease cases)			
Principal CCS diagnosis	**1997**	**2001**	**2005**
Congestive heart failure, nonhypertensive	59,300 (19.5%)	73,738 (20.2%)	96,434 (21.0%)
Chronic obstructive pulmonary disease (COPD)	33,200 (10.9%)	35,789 (9.8%)	36,200 (7.9%)
Pneumonia	21,700 (7.1%)	23,268 (6.4%)	30,769 (6.7%)
Respiratory failure, insufficiency, arrest (adult)	18,000 (5.9%)	17,237 (4.7%)	25,572 (5.6%)
Cardiac dysrhythmias	11,500 (3.8%)	16,553 (4.5%)	20,541 (4.5%)
Coronary atherosclerosis	15,500 (5.1%)	18,225 (5.0%)	15,557 (3.4%)
Acute myocardial infarction (heart attack)	12,100 (4.0%)	13,758 (3.8%)	13,272 (2.9%)
Heart valve disorders	11,100 (3.7%)	11,675 (3.2%)	11,052 (2.4%)
Hypertension with complications and secondary hypertension	7,800 (2.6%)	9,866 (2.7%)	8,964 (2.0%)
Nonspecific chest pain	*Not a top 10 condition in 1997*	5,722 (1.6%)	7,261 (1.6%)
Pulmonary heart disease	4,700 (1.5%)	5,586 (1.5%)	*Not a top 10 condition in 2005*
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 1997, 2001, & 2005.			

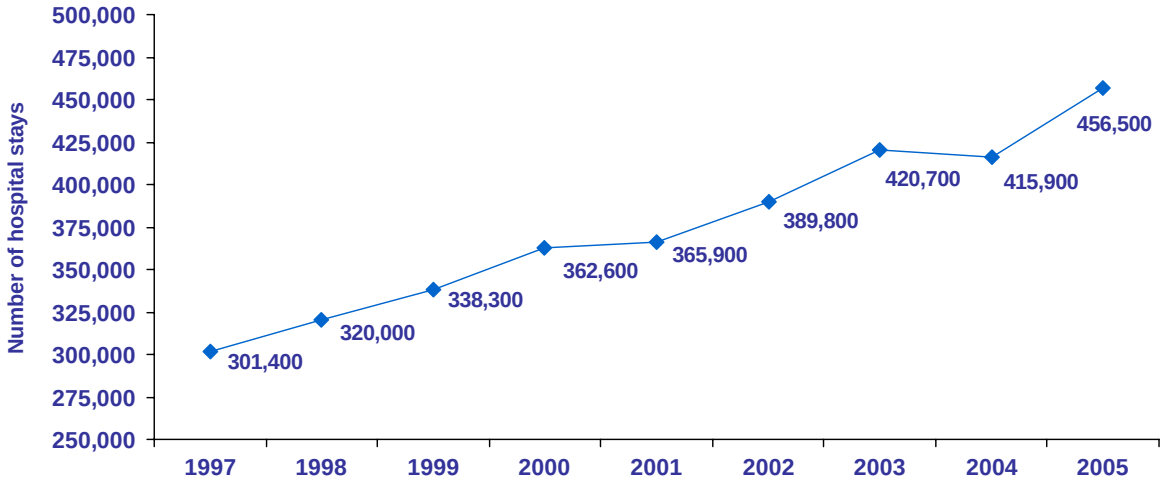
Table 3. Characteristics of CHF hospitalizations with and without presence of pulmonary heart disease as a secondary diagnosis, 2005

	All CHF Stays	CHF Stays with pulmonary heart disease*	CHF Stays without pulmonary heart disease
Number of hospital stays (percentage of CHF stays)	1,090,200 (100.0%)	96,400 (8.8%)	993,800 (91.2%)
Mean cost per stay, dollars	$9,800	$10,500	$9,700
Aggregate cost, dollars	$10.7 billion	$1.0 billion	$9.7 billion
Mean length of stay, days	5.4 days	6.0 days	5.3 days
Percentage of admissions for females	51.9%	58.3%	51.3%
Mean age	73 years	72 years	73 years
Percentage admitted through the ED	69.8%	65.8 %	70.4%
Percentage of hospital stays in which the patient died in the hospital	3.9%	3.4%	3.9%

*Pulmonary heart disease as a secondary diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2005.

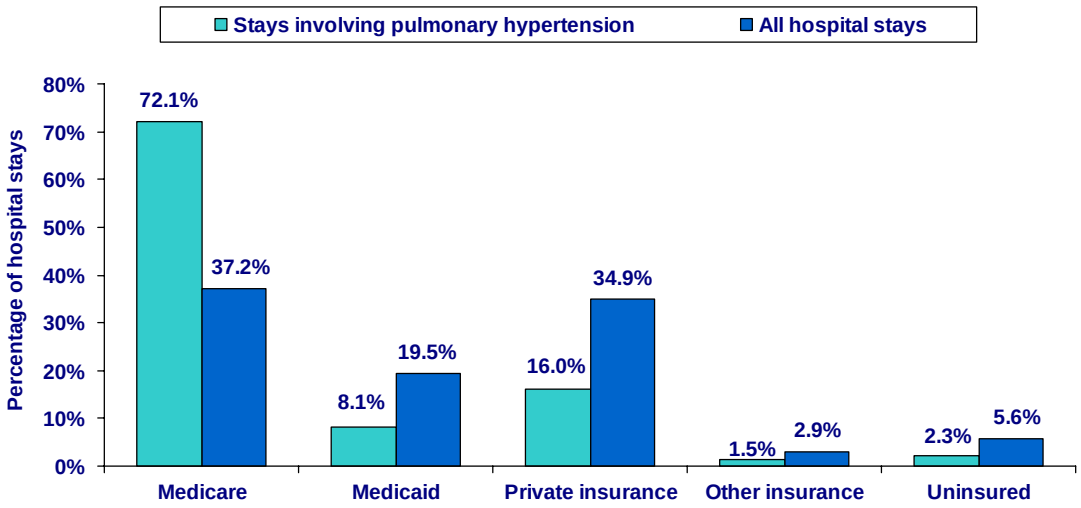
Figure 1. Number of hospital stays with a diagnosis of chronic pulmonary heart disease increased by 50 percent, 1997–2005*



*Based on all-listed diagnoses.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997–2005

Figure 2. Medicare is the expected payer for nearly 3 out of 4 hospital stays involving pulmonary hypertension, 2005*



*Based on all-listed diagnoses.

**Other insurance includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.