

Hospital Stays for Lung Cancer in New Hampshire, 2005

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Highlights

- There were over 2,340 hospitalizations in New Hampshire related to lung cancer in 2005.
- About 66 percent of hospitalizations citing lung cancer had the disease listed as a secondary diagnosis.
- Aggregate charges for all hospitalizations related to lung cancer totaled over 55 million dollars.
- Between 2000 and 2005, the number of stays principally for lung cancer increased by 7.2 percent, while the number of secondary diagnoses increased by about 19 percent.
- Medicare was the most common primary payer for hospitalizations involving lung cancer.
- The Central region had the highest rates for lung cancer stays overall (including stays for which lung cancer was a secondary diagnosis) while South and West had the highest rate of lung cancer hospitalizations as a principal diagnosis.
- The rates of lung cancer related hospitalizations were highest in males 65 years and older.
- Approximately 30 percent of all hospitalizations related to lung cancer had some form of cancer or cancer therapy, including secondary malignancies, other cancers—colon, bladder, kidney, and other forms - lung cancer, fluid and electrolyte disorders, and maintenance of radiotherapy or chemotherapy.
- Nearly a quarter of stays with principal diagnosis of lung cancer had a lobectomy or pneumonectomy as principal procedure, while almost 12 percent had diagnostic bronchoscopy and biopsy of the bronchus.

Introduction

Cancer was the second-leading cause of death in New Hampshire (NH) in 2005. Among all cancers, lung cancer had the highest mortality rate, more than colon, breast, and prostate cancers. Around 980 new lung cancer cases are diagnosed every year in New Hampshire. The lung cancer incidence rate in New Hampshire females (64.8/100,000) is higher than US female rates (54.2/100,000) for 2005. The lung cancer incidence rate for

both males and females together (70.6/100,000) is higher than US total rates (67.4/100,000) for 2005.

Smoking is considered a main cause of lung cancer, yet an estimated 15 percent of cases each year occur in non-smokers.¹ The other causes of this disease are other behavioral, environmental, and hereditary factors, including exposure to substances such as asbestos and radon, pollution, second-hand smoke, or a genetic predisposition to, or family history of, lung cancer.^{2,3}

Currently, there is no generally accepted screening test for lung cancer. Some of the methods like test of *sputum* (mucus brought up from the lungs by coughing), *chest X-rays*, or *spiral (helical) CT scans* are under study.

The choice of treatment depends mainly on the type of lung cancer and its stage. People with lung cancer may have **surgery, chemotherapy, radiation therapy, targeted therapy**, or a combination of treatments.

Lung cancer treatment is not only substantial in terms of time and cost to the patient and family, it also poses risk to the patient including long-term disability and mortality. This reflects the ongoing changes to lifestyle that patients and their families have to make to improve the quality of life of the patient.

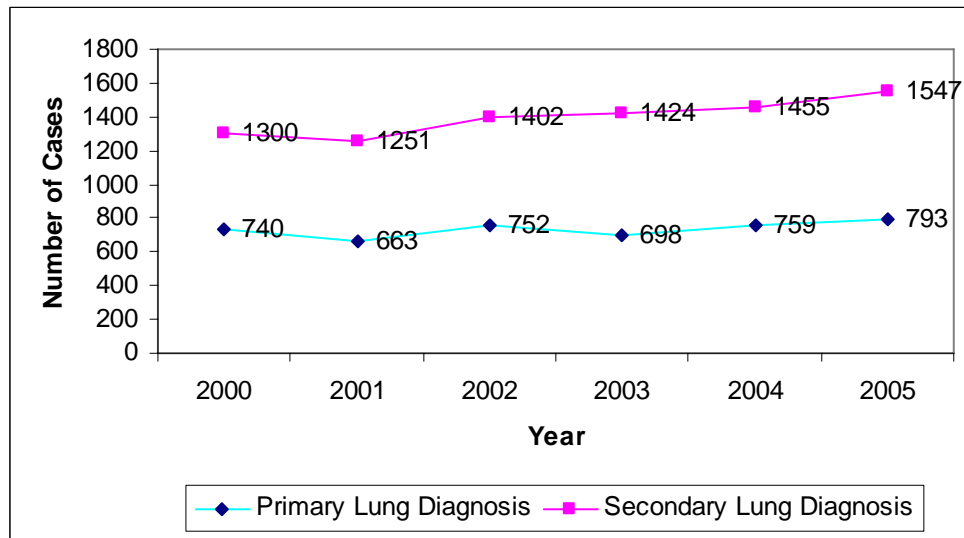
This report presents data from the New Hampshire Hospital Discharge Data on characteristics of hospital stays related to the treatment of lung cancer in New Hampshire in 2005. Characteristics of stays for lung cancer are compared with all non-neonatal hospitalizations. Differences by age, gender, payer, and region are also investigated for principal and secondary lung cancer diagnoses. Additionally, common principal diagnoses and procedures associated with lung cancer related stays are outlined.

Findings

In 2005, there were over 2,340 hospitalizations citing a diagnosis of lung cancer—a rate of 170 stays per 100,000 population. Nearly 34 percent of lung cancer related hospitalizations (793) were principally for lung cancer and totaled \$23 million in hospital charges. In addition, there were approximately 1,547 stays with lung cancer as a secondary diagnosis.

As shown in Figure 1, the number of stays principally for lung cancer has remained relatively stable since 2000, while hospitalizations for lung cancer as secondary diagnosis increased 19 percent during this time. Overall, the total number of lung cancer related hospitalizations has increased 15 percent since 2000, ranging from 2,040 stays in 2000 to a high of 2,340 stays in 2005.

Figure 1. Number of Hospitalizations for Primary and Secondary Diagnosis of Lung Cancer, 2000-2005



General characteristics

Table 1 (page 11) presents the general characteristics of hospital stays involving lung cancer. Although stays principally for lung cancer were over 1.8 days longer than the average non-neonatal hospitalization (6.6 days versus 4.8 days, respectively), the average charge per day was higher by around \$200. Compared with the average hospitalization, stays with a secondary diagnosis of lung cancer had a slightly longer length of stay (5.7 days versus 4.8 days), yet the mean charge per day was slightly lower (\$3,636 versus \$4,068), indicating lower intensity of care for patients with a secondary diagnosis of lung cancer. Patients hospitalized principally for lung cancer were less likely to be admitted through the emergency department (ED) than the average hospitalization (34 percent versus 42 percent). Patients with a secondary diagnosis of lung cancer were admitted through the ED even more often (51 percent).

In-hospital deaths were substantially higher for stays involving lung cancer than the average non-neonatal hospitalization. In 2005, 14.1 percent of stays principally for lung cancer and 11.1 percent of hospitalization with lung cancer as a secondary diagnosis resulted in an in-hospital death -- five times and four times higher than the average non-neonatal hospital stay (2.5 percent).

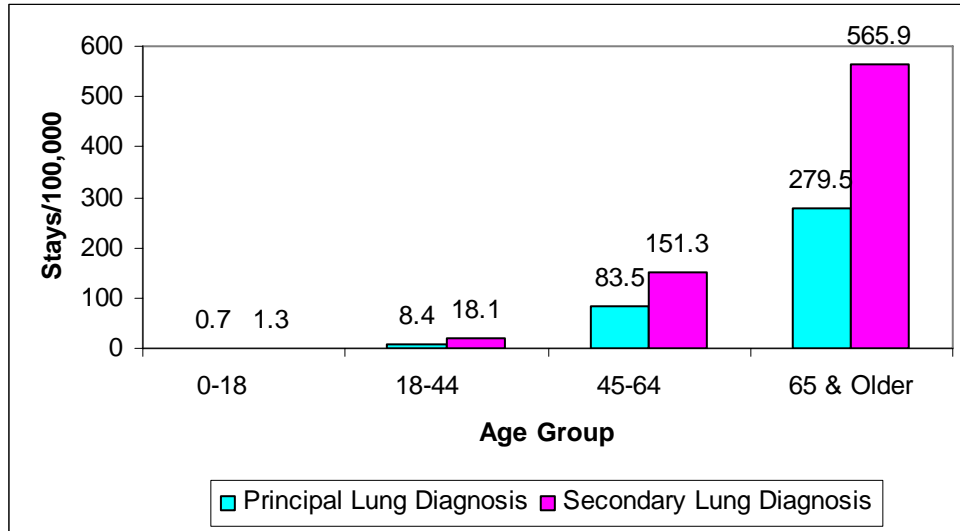
Lung cancer hospitalizations, by age and gender

As shown in Table 1, patients between 18-44 years accounted for only 5.2 percent of stays principally for lung cancer (8.4 stays per 100,000 population) and 5.7 percent of stays with a secondary lung cancer diagnosis (18.1 stays per 100,000 population).

As shown in Figure 2, about 60 percent of lung cancer related stays occurred among patients 65 years and older—a rate of 279.5 stays per 100,000 population for principal lung cancer and a rate of 565.9 stays per 100,000 population for stays with it as a

secondary diagnosis. More than twice as many hospital stays for patients 45 years and older involved a secondary diagnosis of lung cancer, potentially indicating follow-up hospitalizations for sequelae of lung cancer.

Figure 2. Lung Cancer Hospitalizations by Age Group and Diagnosis, 2005



Overall, males were hospitalized more frequently than females for lung cancer. Males accounted for 50 percent of stays principally for lung cancer and 53 percent of stays with a secondary lung cancer diagnosis compared with 40 percent for average non-neonatal hospitalizations (Table 1).

Figures 3 and 4 show the differences in female and male by diagnosis. The graph indicates that for ages 45 years and older, males had a much higher rate of hospitalization. In fact, males over the age of 65 had the highest rates of hospitalization for all lung cancer patients, with 336.0 stays per 100,000 population for principal lung cancer hospitalizations (34 percent higher than females) and 705.3 stays per 100,000 population for stays with a secondary lung cancer diagnosis (53 percent higher than females).

Figure 3. Principal Lung Cancer-Related Hospitalizations Rates by Age Group and by Gender, 2005

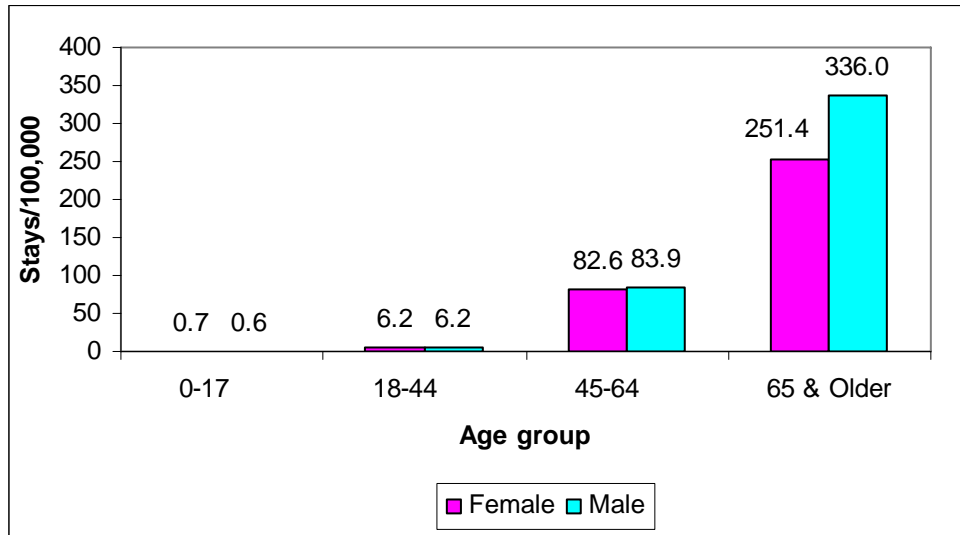
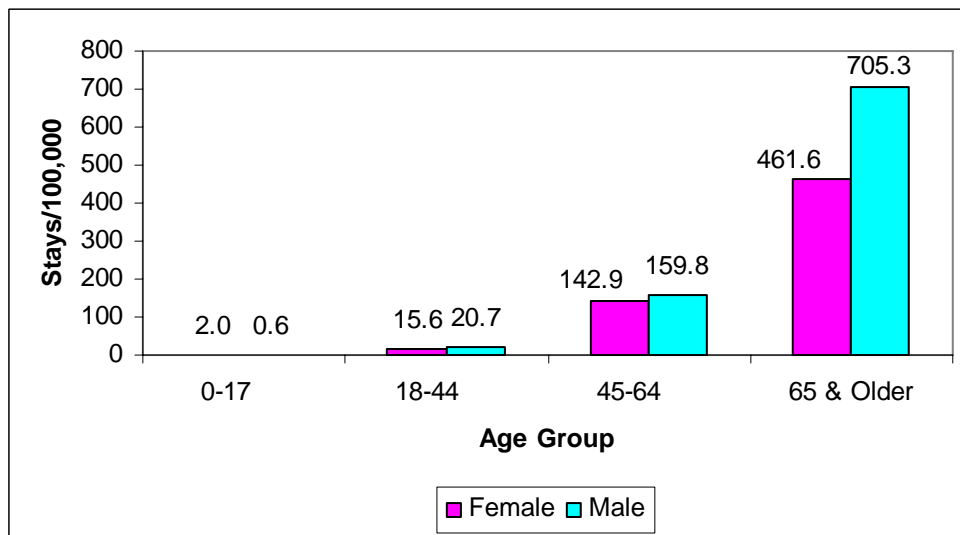


Figure 4. Secondary Lung Cancer-Related Hospitalizations Rates by Age group and by Gender, 2005



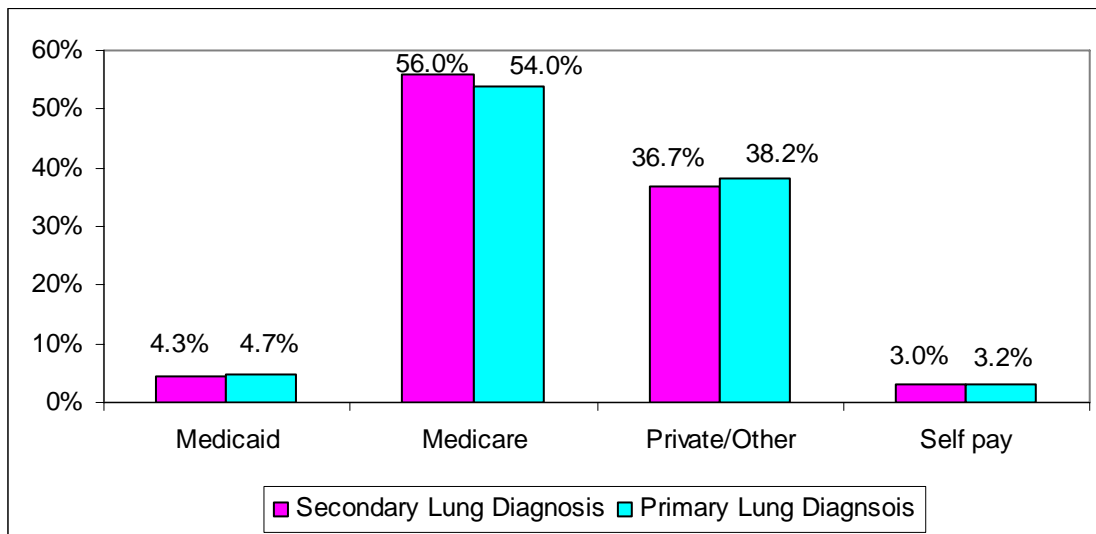
Lung cancer hospitalizations, by primary payer

Analyses by expected primary payer showed a similar distribution for both principal and secondary lung cancer diagnoses (Figure 5). Medicare was the most common primary payer for hospitalizations involving lung cancer, accounting for 54 percent of stays principally for lung cancer and 56 percent of hospitalizations with a secondary diagnosis of lung cancer.

Private/other insurance was the second most common primary payer for both principal and secondary stays, at 38 and 37 percent, respectively.

Self pay, which is considered in some cases as uninsured, was the primary payer for both principal and secondary stays, at 3.2 and 3.0 percent, respectively.

Figure 5. Insurance Status by Diagnosis of Lung Cancer, 2005



Lung cancer hospitalizations, by region

For this report, we could not present the data by county or public health regions as the numbers were small. For this report purpose we have combined counties by geography than for any other reason. Overall, Southern New Hampshire had more hospitalizations followed by the Central region for lung cancer. Southern New Hampshire accounted for 51.6 percent of stays principally for lung cancer and 50.1 percent of stays with a secondary lung cancer diagnosis compared with Central at 17.3 and 17.5 percent for the same (Table 1).

As shown in Figure 6, the Central region had the highest rates of lung cancer related hospitalizations (176.7 stays per 100,000 populations) while Northern New Hampshire had the lowest rates (153.1 stays per 100,000 population). However, rates of hospitalization by region varied by the type of lung cancer diagnosis. As a principal diagnosis, lung cancer was most prevalent in the South and West (59.5 stays per 100,000 population) and lowest in the North (49.2 stays per 100,000 population). As a secondary diagnosis, the Central region had the highest rate—117.7 stays per 100,000 population. The North and West had the lowest rate of secondary diagnoses, with 104.0 stays per 100,000 population.

Regions are defined as

North: Coos and Grafton

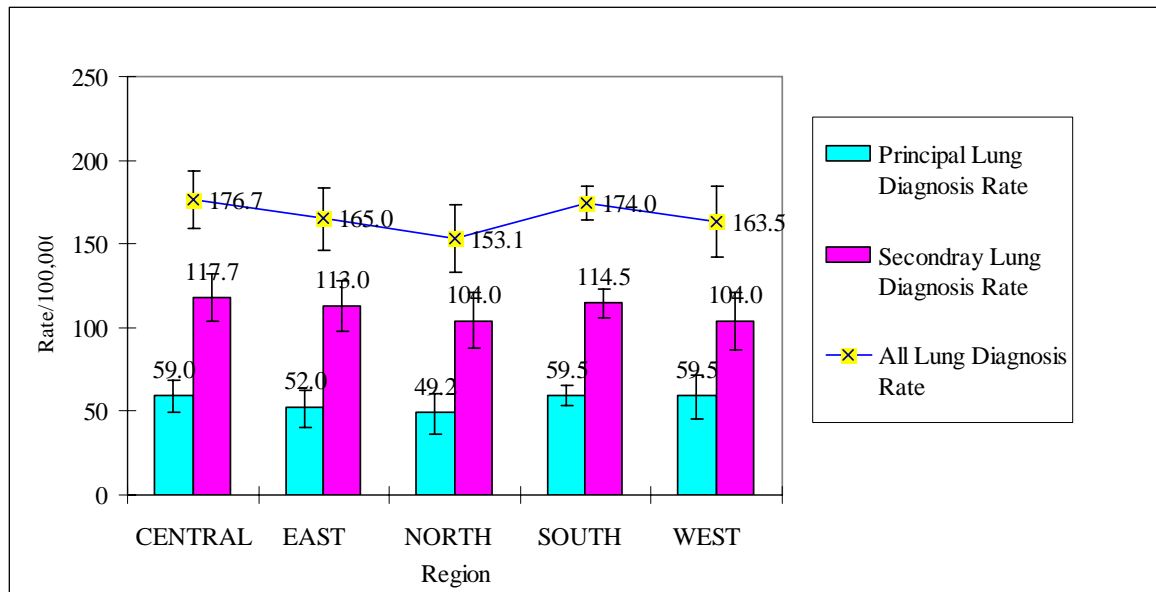
West: Cheshire and Sullivan

South: Hillsborough and Rockingham

East: Carroll and Strafford

Central: Belknap and Merrimack

Figure 6. Lung Cancer-Related Hospitalizations Rates by Region, 2005



Principal diagnoses for lung cancer hospitalizations

About 66 percent of hospitalizations citing lung cancer had the disease listed as a secondary diagnosis. Table 2 (page 12) lists the top principal diagnoses for stays where lung cancer was present as any diagnosis. Fifteen of the top 20 diagnoses were cancer, respiratory disease, or circulatory disease. Approximately 30 percent of all hospitalizations related to lung cancer had some form of cancer or cancer therapy as a principal diagnosis, including secondary malignancies (20.2 percent), and other cancers (6.5 percent)—colon, bladder, kidney, and other forms, lung cancer (2.4 percent), fluid and electrolyte disorders (5.5 percent) and maintenance of radiotherapy or chemotherapy (4.5 percent).

Respiratory diagnoses were also common principal reasons for hospital stays involving lung cancer. Pneumonia accounted for approximately 8.9 percent of lung cancer-related stays, followed by chronic obstructive pulmonary disease and bronchiectasis, pleurisy, pneumothorax, and pulmonary collapse, and respiratory failure. Circulatory diseases were also important principal diagnoses and included cardiac arrhythmias, congestive heart failure, stroke, acute myocardial infarction, coronary atherosclerosis, and phlebitis and thromboembolism.

Common procedures associated with lung cancer related hospitalizations

Table 3 (page 13) compares the frequency of the ten most common procedures performed during stays principally for lung cancer with the frequency of these procedures among hospitalization noting a secondary diagnosis of lung cancer. Nearly 23.7 percent of stays principally for lung cancer had a lobectomy or pneumonectomy as principal procedure followed by diagnostic bronchoscopy and biopsy of the bronchus, at 12.0 percent. In comparison, fewer than 2 percent (1.4 percent) of stays with a secondary lung cancer diagnosis noted diagnostic bronchoscopy and biopsy of the bronchus, while fewer than 1 percent (0.6 percent) noted a lobectomy or pneumonectomy.

However, other procedures related to the diagnosis or treatment of the lung cancer itself, as opposed to other diagnoses, were common in all lung cancer related hospitalizations. These procedures included chest drainage, respiratory intubations and mechanical ventilation, therapeutic radiology, and cancer chemotherapy.

Blood transfusions were the most common procedure performed during hospitalizations with a secondary diagnosis of lung cancer, accounting for 3.6 percent of these stays. It was also common among stays principally for lung cancer (1.6 percent).

Conclusions

- There were around 2,340 hospitalizations related to lung cancer in 2005 in New Hampshire.
- About 66 percent of hospitalizations citing lung cancer had the disease listed as a secondary diagnosis.
- Aggregate charges for all hospitalizations related to lung cancer totaled over 55 million dollars.
- Between 2000 and 2005, the number of stays principally for lung cancer increased by 7.2 percent, while the number of secondary diagnoses increased about 19 percent.
- The Central region had the highest rates for lung cancer stays overall (including stays for which lung cancer was a secondary diagnosis), while the South and West had the highest rate of lung cancer hospitalizations as a principal diagnosis.
- The rates of lung cancer related hospitalizations were highest in males 65 years and older.
- Approximately 30 percent of all hospitalizations related to lung cancer had some form of cancer or cancer therapy as a principal diagnosis, including secondary malignancies, other cancers—colon, bladder, kidney, and other forms, lung cancer, fluid and electrolyte disorders and maintenance of radiotherapy or chemotherapy.
- Nearly a quarter of stays with principal diagnosis of lung cancer had a lobectomy or pneumonectomy as principal procedure, while almost 12 percent had diagnostic bronchoscopy and biopsy of the bronchus.
- Medicare was the most common primary payer for hospitalizations involving lung cancer.

Next steps

1. Review and compare treatment procedures associated with primary and secondary lung cancer diagnosis.
2. Examine the possibility of matching records between cancer cases in the New Hampshire State Cancer Registry (NHSCR) and cancer patients in the hospital discharge data in New Hampshire.

3. Improve record linkage not only for health research but also to understand the various issues involved in cancer continuum of care through a longitudinal follow-up.

Data source

To examine the use of lung cancer treatment and prevalence, New Hampshire Hospital Discharge Data for the years 2000 through 2005 were analyzed. Hospital discharges for patients with a principal diagnosis of Lung Cancer (ICD 9CM 1620, 1622, 1623, 1624, 1625, 1628, 1629, 2357, 2391, 1970, 2312 and 2123) were examined to determine patient characteristics. Supplemental source included data on New Hampshire population from Office of Health Statistics and Data Management.

Definitions

Diagnoses, ICD-9-CM

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.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 13,600 ICD-9-CM diagnosis codes.

Case definition

For this report, Lung Cancer was defined: Hospital discharges for patients with a principal diagnosis or secondary diagnosis of Lung Cancer (ICD 9CM 1620, 1622, 1623, 1624, 1625, 1628, 1629, 2357, 2391, 1970, 2312 and 2123)

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.

Hospital charges

Total hospital charges were based on hospital net amounts in dataset. Charges represent what the hospital billed for the case. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. For the purposes of this report, charges are reported to the nearest hundred.

Payer

Payer is the expected primary payer for the hospital stay. To make coding uniform across all Hospital Discharge Data, 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.

Private/Other insurance includes Blue Cross, commercial carriers, private HMOs and PPOs and Other Government insurance like TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.

Workers compensation includes only Worker compensation.

Self-pay includes an insurance status of self-pay or uninsured.

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

Region

Region is one of the five regions which include counties of New Hampshire:

North: Coos and Grafton

West: Cheshire and Sullivan

South: Hillsborough and Rockingham

East: Carroll and Strafford

Central: Belknap and Merrimack

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. Admission from another hospital indicates the patient was admitted to this hospital from another short-term, acute-care hospital. This usually signifies that the patient required the transfer in order to obtain more specialized services that the originating hospital could not provide. Admission from long-term care facility indicates the patient was admitted from a long-term facility such as a nursing home or hospice.

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.

References

1. Lung Cancer Fact Sheet. American Lung Association. October 2007.
2. Cancer Topics. Lung Cancer. National Cancer Institute, National Institutes of Health, 2009.
3. Q&A: Lung Cancer in Non-Smokers. *CancerWise*. University of Texas M.D. Anderson Cancer Center. November 2007.

Contact information

New Hampshire Department of Health and Human Services, Division of Public Health Services, Office of Health Statistics and Data Management, 29 Hazen Drive, Concord, NH 03301, sai.s.cherala@dhhs.state.nh.us

Table 1. Characteristics of hospitalizations related to lung cancer compared with hospitalizations for all conditions, 2005			
	Hospital stays principally for lung cancer	Hospital stays with a secondary diagnosis of lung cancer	Hospital stays for all conditions*
Total number of hospitalizations	793	1,547	114,202
Utilization characteristics			
Mean length of stay, days	6.6	5.7	4.8
Mean charge per hospitalization	\$28,268	\$20,585	\$19,674.70
Mean charge per day	\$4,257	\$3,636	\$4,068
Aggregate charges	\$22 million	\$32 million	\$2,247 million
Admitted through the Emergency Department	31.0%	49.0%	42.0%
Died in hospital	14.1%	11.1%	2.5%
Patient characteristics			
Mean age, years	65.7	66	55.1
Percentage by age group:			
0 to 18 years	0.3%	0.3%	5.4%
18 to 44 years	5.2%	5.7%	28.3%
45 to 64 years	37.7%	35.0%	26.1%
65 years and older	56.9%	59.0%	40.2%
Percentage of patients male	50.10%	53.10%	40.70%
Insurance characteristics			
Percentage by Payer			
Medicaid	4.7%	4.3%	8.6%
Medicare	54.0%	56.0%	43.4%
Private/Other	38.2%	36.7%	42.0%
Self pay	3.2%	3.0%	5.3%
Workers compensation			0.6%
Regional characteristics			
Percentage by Region			
CENTRAL	17.3%	17.5%	16.4%
EAST	11.9%	13.3%	12.8%
NORTH	8.8%	9.6%	9.5%
SOUTH	51.6%	50.1%	51.8%
WEST	10.5%	9.4%	9.6%
*Stays for newborn have been excluded			
Source: New Hampshire Department of Health and Human Services, Division of Public Health Services, Office of Health Statistics and Data Management, Inpatient Hospitalization Data, 2005.			

Table 2. Top 20 principal diagnoses among secondary diagnosis of lung cancer related hospitalizations, 2005

Rank	Principal Diagnosis	Number of stays	Percentage of all lung cancer hospitalizations
1	Secondary malignancies	312	20.2%
2	Pneumonia	138	8.9%
3	Other cancer diagnoses	101	6.5%
4	Fluid and electrolyte disorders	85	5.5%
5	Maintenance chemotherapy, radiotherapy	69	4.5%
6	Phlebitis, thrombophlebitis and thromboembolism	67	4.3%
7	Chronic obstructive pulmonary disease and bronchiectasis	49	3.2%
8	Anemia	45	2.9%
9	Septicemia (except in labor)	43	2.8%
10	Cancer of bronchus, lung	37	2.4%
11	Cardiac dysrhythmias	36	2.3%
12	Pleurisy, pneumothorax, pulmonary collapse	35	2.3%
13	Respiratory failure, insufficiency, arrest (adult)	33	2.1%
14	Acute cereberovascular disease (stroke)	28	1.8%
15	Acute myocardial infarction (MI)	20	1.3%
16	Congestive heart failure, non-hypertensive	15	1.0%
17	Fractures	15	1.0%
18	Rehabilitation care, fitting of prostheses, and adjustment of devices	13	0.8%
19	Gastrointestinal Hemorrhage	11	0.7%
20	Coronary atherosclerosis	9	0.6%

Table 3. Top 10 all-listed procedures for principal lung cancer stays compared to stays with a secondary lung cancer diagnosis, 2005				
All-Listed Procedure	Rank	Percentage of principal lung cancer stays (n=793)	Rank	Percentage of stays with a secondary diagnosis of lung cancer (n=1547)
Lobectomy and Pneumonectomy	1	23.7%	33	0.6%
Lung Biopsy	2	12.0%	9	1.4%
Lung Resection	3	8.2%	64	0.2%
Thoracentesis	4	2.5%	3	2.8%
Mediastinoscopy	5	1.9%	41	0.3%
Radiation Therapy	6	1.8%	6	1.6%
Blood Transfusion	7	1.6%	1	3.6%
Chest Drainage	8	1.4%	4	2.0%
Lymphatic Structure Biopsy	9	1.4%	54	0.3%
Ultrasound Heart	10	1.0%	8	1.4%