Journal of Cancer Management and Research
2024 Volume 2, Issue 1
DOI: 10.59657/2996-4563.brs.24.009

Research Article Open Access

Comparing HealthCare Standards: Hospital Teaching Status and Lung Cancer Patient Hospitalizations

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Abstract

Introduction: We conducted a comprehensive cross-sectional analysis to investigate the potential impact of both hospital volume and teaching status on patient outcomes among those hospitalized with lung cancer.

Materials and Methods: Employing the National Inpatient Sample (NIS) data from the years 2019 to 2020, we identified individuals who were hospitalized with a primary diagnosis of lung cancer. Subsequently, we divided the cohort into two groups: those who were hospitalized in teaching hospitals, and those who were hospitalized in non-teaching hospitals. Subsequently, a multivariate regression analysis was conducted to adjust for confounding variables, and both primary and secondary outcomes were examined in each group.

Results: A total of 221,320 patients were hospitalized with lung cancer in the United States across all hospitals in 2019 and 2020. Of these, 42,050 (19.01%) were hospitalized in non-teaching hospitals, while 177,056 (80.98%) were hospitalized in teaching hospitals. There was no significant difference in mortality (OR 0.88, 95% CI 0.77-1.00, P=0.06) or length of stay (+0.15 days, 95% CI -0.04-0.34, P=0.141) in the hospital between teaching and non-teaching hospitals. However, the total cost of hospitalization was higher for patients admitted to teaching hospitals (+USD 8255, 95% CI 3746-12765, P<0.001). Additionally, patients in teaching hospitals had a higher incidence of sepsis (OR 1.32, 95% CI 1.07-1.63, P=0.010), acute respiratory failure (OR 1.79, 95% CI 1.73-1.86, p<0.001), ICU admissions (OR 1.12, 95% CI 1.18-1.26, P=0.035), and surgical interventions of the lungs (OR 1.60, 95% CI 1.42-1.80, p<0.001). On the other hand, there was a lower incidence of acute coronary syndrome (OR 0.60, 95% CI 0.43-0.84, P=0.003), pneumonia (OR 0.72, 95% CI 0.66-0.78, P<0.001), blood transfusion (OR 0.83, 95% CI 0.70-0.98, P=0.028), and anaemia (OR 0.87, 95% CI 0.81-0.94, P<0.001) in patients admitted to teaching hospitals.

Conclusions: Patients admitted to teaching hospitals with lung cancer tend to incur higher costs of hospitalization and increased resource utilization. This is often attributed to the provision of high levels of care and frequent admissions to the intensive care unit. Moreover, teaching hospitals are known for their higher rates of accepting transfers of sicker patients necessitating advanced levels of care.

Keywords: lung cancer; primary diagnosis; incur higher costs; hospitalization; anaemia

Introduction

Lung cancer is one of the most prevalent and deadly forms of cancer worldwide, with a remarkably low survival rate of only 18% [1]. The high mortality can be largely attributed to late-stage diagnosis, often as incidental findings on imaging before the establishment of screening guidelines for lung cancer. As a result, lung cancer tends to progress rapidly and frequently leads to hospitalization for surgical resections and complications arising from the disease itself [2]. Teaching hospitals, with their residents and fellows still in training, have traditionally been associated with a higher risk of medical neglect and complications [3]. This notion is coupled with the understanding that these hospitals are more expensive than community hospitals due to their advanced levels of care. However, it is also argued that this cost is justified by the superior healthcare facilities and resources available at teaching hospitals, which should result in fewer adverse events.

Prior research has thoroughly investigated the surgical outcomes and complications in lung cancer patients by comparing their outcomes in teaching versus nonteaching hospitals. However, as lung cancer progresses to advanced stages, curative surgical intervention may become limited or ineffective, resulting in an increased risk of complications and hospitalization [4]. In our study, we focused on lung cancer hospitalizations without specific patient criteria. We analysed both surgical and medical complications, as well as resource utilization, with the aim of providing a comprehensive comparison to existing literature and offering insights that can inform clinical practice guidelines. We conducted a study to comprehensively analyse the incidence and risk of adverse outcomes, specifically comparing them between these two categories of hospitals. Our hypothesis posits that there is no disparity between teaching and nonteaching hospitals in terms of the risk of adverse outcomes for patients hospitalized with lung cancer, as well as in the utilization of resources. To test this hypothesis, we employed a cross-sectional study design using the most recent data from the National Inpatient Sample 2019 and 2020 for patients who were hospitalized with lung cancer as the primary discharge diagnosis.

Materials and Methods

In conducting this research, we delved into the National Inpatient Sample (NIS) database, a robust and expansive repository encompassing data from approximately eight million hospital stays annually. As the largest all-payer inpatient care database in the United States, constructed from billing data sourced from State Inpatient Databases, it is meticulously designed to mirror around 20% of US community hospitals. Our examination of the NIS database involved an exhaustive analysis, enabling us to unearth crucial insights that underpinned our research inquiries. This study utilized the National Inpatient Sample (NIS) data from 2019 and 2020 to identify patients who were hospitalized with a primary discharge diagnosis of lung cancer and were of age greater than 18 years. The cohort was subsequently divided into two subgroups based on their admission to teaching versus non-teaching hospitals. Our study utilized the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) as the basis for our coding methodology. This observational approach allowed for the examination of mortality rates and clinical outcomes in hospitalized lung cancer patients in both teaching and non-teaching hospitals across a large and diverse patient population. Categorical data were represented as percentages, while continuous variables were characterized by mean values and standard deviations. Pearson's chi-square test or Fisher's exact test was employed to compare outcomes among different groups for categorical variables, while the student's t-test was used for continuous variables. Univariate and multivariate analyses were conducted to determine the associations of different outcomes in lung cancer patients. The primary objective of this research was to determine whether hospital teaching status affects patient outcomes and whether certain outcomes are more likely to occur in teaching hospitals versus non-teaching hospitals. However, this study will not address the numerous factors that may contribute to adverse outcomes in patients admitted to hospitals based on teaching versus non-teaching status, as this is not the focus of the research and the limitation of NIS data in terms of individual patient-level feedback. However, it will provide valuable insight into the incidence of certain events. This information will be crucial for improving resource utilization and modifying practices to prevent future occurrences. Additionally, these insights will guide the ongoing care of patients based on calculated probabilities. The statistical analyses were performed using Stata 17 software (College Station, TX, USA), which greatly contributed to addressing the research questions and hypotheses. These analyses enhanced the overall quality and rigor of the study.

Results

A total of 221,320 patients with lung cancer were included in a study conducted across all hospitals in the United States in 2019 and 2020. Of these, 42,050 (19.01%) were hospitalized in non-teaching hospitals, while 177,056 (80.98%) were hospitalized in teaching hospitals. The mean age of patients admitted to non-teaching hospitals was 69.85 ± 10.08 years, while the mean age of patients admitted to teaching hospitals was 68.59 ± 10.33 years; the difference was statistically significant ($P < 0.001$). A larger proportion of white patients (85.03%) were admitted to non-teaching hospitals, while a greater percentage of Blacks (14.13%), Hispanics (5.31%), and other races (2.56%) were admitted to teaching hospitals ($P < 0.001$). Non-teaching hospitals had a greater proportion of patients in low-income groups ($1-49,999 = 33.49% vs 27.53% & $50,000-$64,999= 30.89% vs 25.77), while teaching hospitals had a greater proportion of patients with high incomes ($65,000-$85,999= 24.79% vs 21.24% & >$86,000 = 21.91% vs 14.38%, $P < 0.001$).

A greater proportion of patients with Medicare (69.54%) were admitted to non-teaching hospitals, while a greater proportion of patients with private insurance (22.86%) were admitted to teaching hospitals (P < 0.001). No disparity was observed in the admission of patients with Medicaid (9.85% vs 9.4%) and patients with no insurance (2.15% vs 2.52%) between teaching and non-teaching hospitals (P < 0.001).

The prevalence of Hyperlipidemia was higher in teaching hospitals compared to nonteaching hospitals (40.51% vs 38.21%, P<0.001). Conversely, nonteaching hospitals had a greater proportion of patients with Fluid and electrolyte disorders (28.54% vs 24.49%, P<0.001), Dementia (4.01% vs 3%, P<0.001), Anaemia (27.68% vs 25.55%, P<0.001), Malnutrition (15.71% vs 14.89%, P<0.001), COPD (42.69% vs 35.57%, P<0.001), coronary artery disease (92.24% vs 21.75%, P<0.001), Heart failure (12.7% vs 11.24%, P<0.001), and atrial fibrillation (17.75% vs 16.6%, P=0.013). Moreover, a higher percentage of patients in nonteaching hospitals were discharged to homes with home health services (35.51% vs 30.74%) and skilled nursing facilities (4.64% vs 1.38%) compared to teaching hospitals, which discharged a greater proportion of patients directly to homes (67.15% vs 59.02%) (Table 1).

Table 1: Comparison of baseline characteristics of Lung cancer patients in Teaching vs non-teaching hospitals

	Non-Teaching Hospitals (%)	Teaching Hospitals (%)	P- value
No. of patients	42050	177056	
Patient Characteristics			
Gender (%)			P = 0.001
Male	21471 (51.06)	87023 (49.15)	
Female	20579 (48.94)	90033 (50.85)	
Age			
Mean Age (SD)	69.85(10.08)	68.59(10.33)	P<0.001
Age Distribution (%)			P<0.001
18-35	46 (0.11)	602 (0.34)	
36-45	446 (1.06)	2567 (1.45)	
46-64	12190 (28.99)	56286 (31.79)	
>65	29368 (69.84)	117601 (66.42)	
Race (%)			P<0.001
White	35755 (85.03)	138104 (78)	
Black	3759 (8.94)	25018 (14.13)	
Hispanic	1703 (4.05)	9402 (5.31)	
Other	833 (1.98)	4533 (2.56)	
Median household income national quartile for patient zip code (%)			P<0.001
$1-$49,999	14083 (33.49)	48744 (27.53)	
$50,000-$64,999	12989 (30.89)	45627 (25.77)	
$65,000-$85,999	8931 (21.24)	43892 (24.79)	
>$86,000	6047 (14.38)	38793 (21.91)	
Charlson comorbidity index (%)			P<0.001
2	5168 (12.29)	28010 (15.82)	
3 or more	36882 (87.71)	149046 (84.18)	
Insurance Provider (%)			P<0.001
Medicare	29242 (69.54)	115334 (65.14)	
Medicaid	3953 (9.4)	17440 (9.85)	

Private	7796 (18.54)	40475 (22.86)	
Uninsured	1060 (2.52)	3807 (2.15)	
Comorbidities (%)			
Hypertension	19263 (45.81)	82915 (46.83)	P = 0.118
Diabetes Mellitus	8351 (19.86)	35500 (20.05)	P = 0.703
Chronic Kidney Disease			
CKD2	341 (0.81)	1416 (0.8)	P = 0.926
CKD3	2502 (5.95)	9437 (5.33)	P = 0.036
CKD4	370 (0.88)	1717 (0.97)	P = 0.428
CKD5	21 (0.05)	124 (0.07)	P = 0.623
CKD Unspecified	1232 (2.93)	5259 (2.97)	P = 0.853
ESRD	282 (0.67)	1470 (0.83)	P = 0.145
Hyperlipidemia (HLD)	16067 (38.21)	71725 (40.51)	P<0.001
Fluid and Electrolyte Disorders	12001 (28.54)	43361 (24.49)	P<0.001
Dementia	1686 (4.01)	5312 (3)	P<0.001
Peptic ulcer disease	534 (1.27)	2213 (1.25)	P = 0.879
Chronic Liver Disease	8 (0.02)	53 (0.03)	P<0.001
Anemia	11639 (27.68)	45238 (25.55)	P <0.001
Malnutrition	6606 (15.71)	26364 (14.89)	P = 0.111
COPD	17951 (42.69)	62979 (35.57)	P<0.001
Coronary artery disease	9436 (22.44)	38510 (21.75)	P = 0.201
Heart Failure	5340 (12.7)	19901 (11.24)	P<0.001
Atrial Fibrillation	7464 (17.75)	29391 (16.6)	P = 0.013
History of CVA	299 (0.71)	1558 (0.88)	P = 0.127
Discharge Disposition (%)			P<0.001
Home	24818 (59.02)	118893 (67.15)	
Home with home health	14932 (35.51)	54427 (30.74)	
Skilled nursing facility	1951 (4.64)	2443 (1.38)	
Against Medical Advice	345 (0.82)	1293 (0.73)	
Hospital characteristics (%)			
Bed size of hospital (STRATA)			P<0.001
Small	4617 (10.98)	30648 (17.31)	
Medium	9878 (23.49)	48496 (27.39)	
Large	27555 (65.53)	97912 (55.3)	
Hospital location			P<0.001
Rural	11492 (27.33)	0	
Urban	30558 (72.67)	177056 (100)	
Region of hospital			P<0.001
Northeast	5303 (12.61)	42812 (24.18)	
Midwest	9289 (22.09)	41502 (23.44)	
South	20150 (47.92)	66555 (37.59)	
West	7308 (17.38)	26187 (14.79)	

COPD: Chronic obstructive pulmonary disease; CVA: Cardiovascular accident; SD: Standard deviation; CKD: Chronic kidney disease

After adjusting for confounding variables, hospital teaching status was not found to be an independent predictor of mortality in lung cancer patients (OR 0.88, 95% CI 0.77-1.00, P=0.06). Additionally, there was no significant difference in length of stay between teaching and non-teaching hospitals (+0.15 days, 95% CI -0.04-0.34, P=0.141). However, the total cost of hospitalization was significantly higher for patients admitted to teaching hospitals compared to non-teaching hospitals (+USD 8255, 95% CI 3746-12765, P<0.001 (Table 2).

Table 2: Comparison of length of stay (LOS) and total cost of hospitalization in Lung cancer patients in Teaching vs Nonteaching hospitals

	Non-Teaching Hospitals	Teaching Hospitals	P-value
LOS Days (Unadjusted)	5.84(5.69-5.99)	6.07(0.03-0.41)	P=0.010
Total Charges USD (Unadjusted)	77701(74679-80724)	93108(11461-19353)	P<0.001
	Coefficient	95% Confidence Interval	
Adjusted Difference in the LOS	0.15	-0.04-0.34	P=0.141
Adjusted Difference in Total charges	8255	3746-12765	P<0.001

USD: United States Dollar

The incidence of sepsis was found to be 2.31% in Teaching hospitals and 1.85% in nonteaching hospitals. The likelihood of sepsis was higher in Teaching hospitals, with an odds ratio (OR) of 1.32 (95% confidence interval [CI], 1.07-1.63, P=0.010).

Similarly, the incidence of Intensive care unit (ICU) admission was 8.16% in Teaching hospitals and 7.38% in nonteaching hospitals. The likelihood of being admitted to the ICU was higher in Teaching hospitals, with an OR of 1.12 (95% CI, 1.18-1.26, P=0.035).

The incidence of vasopressor use was 1.42% in Teaching hospitals and 0.4% in nonteaching hospitals. The likelihood of vasopressor use was higher in Teaching hospitals, with an OR of 2.85 (95% CI, 1.81-4.49, P<0.001).

The incidence of Acute respiratory failure was 17.21% in Teaching hospitals and 14.38% in nonteaching hospitals. The likelihood of Acute respiratory failure was higher in Teaching hospitals, with an OR of 1.79 (95% CI, 1.73-1.86, P<0.001).

The incidence of Invasive mechanical ventilation was 6.83% in Teaching hospitals and 6.55% in nonteaching hospitals. The probability of Invasive mechanical ventilation was higher in Teaching hospitals (OR 1.07, 95% CI 1.012-1.21, p=0.002).

The incidence of Acute coronary syndrome (ACS) was 0.48% in Teaching hospitals and 0.79% in nonteaching hospitals. The likelihood of Acute coronary syndrome (ACS) was lower in Teaching hospitals (OR 0.60, 95% CI 0.43-0.84, p=0.003).

The incidence of Pneumonia was 15.28% in Teaching hospitals and 20.91% in nonteaching hospitals. The probability of Pneumonia was lower in Teaching hospitals (OR 0.72, 95% CI 0.66-0.78, p<0.001).

The incidence of Blood transfusion was 3.48% in Teaching hospitals and 4.47% in nonteaching hospitals. The probability of Blood transfusion was lower in Teaching hospitals (OR 0.83, 95% CI 0.70-0.98, p=0.028).

The incidence of Anaemia was 25.55% in Teaching hospitals and 27.67% in nonteaching hospitals. The likelihood of Anaemia was lower in Teaching hospitals (OR 0.87, 95% CI 0.81-0.94, p<0.001) (Table 3).

Table 3: Comparison of Proportions and Odds ratios of secondary outcomes in lung cancer patients in Teaching vs non-teaching hospitals

Secondary Outcomes	Non-Teaching Hospitals (%)	Teaching Hospitals (%)	Adjusted OR (95% CI)	P-value
Mortality	8.01	6.11	0.88(0.77-1.00)	P=0.06
Sepsis	1.85	2.31	1.32(1.07-1.63)	P=0.010
Intensive care unit (ICU)	7.38	8.16	1.12(1.18-1.26)	P=0.035
Vasopressors	0.4	1.42	2.85(1.81-4.49)	P<0.001
Acute Respiratory Failure	14.38	17.21	1.79(1.73-1.86)	P<0.001
Mechanical ventilation	6.55	6.83	1.07(1.012-1.21)	P=0.002
Cardiac arrest	0.89	0.82	1.01(0.74-1.37)	P=0.923
Acute coronary syndrome	0.79	0.48	0.60(0.43-0.84)	P=0.003
Acute kidney injury	11.26	10.99	1.01(0.91-1.12)	P=0.761
Acute liver failure	0.67	0.49	1.14(0.77-1.68)	P=0.495
Pneumonia	20.91	15.28	0.72(0.66-0.78)	P<0.001
Blood transfusion	4.47	3.48	0.83(0.70-0.98)	P=0.028
Anemia	27.67	25.55	0.87(0.81-0.94)	P<0.001
Major and minor bleeding episodes	1.69	1.74	1.15(0.92-1.43)	P=0.204
Platelets transfusion	0.73	0.54	0.80(0.57-1.13)	P=0.220
Radiation therapy	0.1	0.1	0.92(0.34-2.45)	P=0.875
Chemotherapy	0.13	0.13	1.02(0.47-2.19)	P=0.959
Surgical resections of lung	7.93	13.54	1.60(1.42-1.80)	P<0.001

OR: Odds ratio; CI: Confidence interval

Discussion

The findings from our comprehensive study indicate no significant difference in mortality based on the hospital's teaching status. However, patients admitted to teaching hospitals exhibited a higher likelihood of developing sepsis, acute respiratory failure, requiring vasopressors, and being admitted to the ICU and being on mechanical ventilation. Furthermore, our study revealed that surgical resections were more frequently performed at teaching hospitals than non-teaching hospitals. Our research is unique as it offers a holistic exploration of the impact of teaching versus non-teaching hospitals on hospitalized lung cancer patients. While existing studies have examined surgical outcomes for various conditions and analysed the influence of hospital teaching status on different diseases requiring hospitalization, none mirror our specific approach. Meguid RA et al. conducted a retrospective analysis using the National Inpatient Sample, which bears similarity to our present study. Their research examined the outcomes based on the types of lung cancer resections, namely segmentectomy, lobectomy, and pneumonectomy [5]. Notably, their findings diverge from ours, as they observed a decline in mortality associated with surgical outcomes in teaching hospitals in comparison to non-teaching hospitals.

Similarly, Dimick JB et al. conducted a comprehend-sive analysis of surgical resections in oesophageal, hepatic, and pancreatic cancer utilizing data from the NIS 1996-1997. Their focus was on evaluating outcomes based on the volume of surgeries performed and classifying hospitals as high volume if they exceeded the 50th percentile of the median. The primary outcome measures were mortality and length of stay. Notably, their study findings revealed that teaching hospitals exhibited decreased odds of mortality compared to non-teaching hospitals [6]. In a similar vein, Chaudhry and associates conducted an analysis of the influence of hospital teaching status on mortality and other outcomes in patients hospitalized due to acute pancreatitis. Their study demonstrated that teaching hospitals displayed increased odds of mortality and adverse events in contrast to patients admitted to non-teaching hospitals. Our results align closely with the conclusions drawn from this research [7]. Hayanga AJ et al undertook a retrospective analysis utilizing the National Inpatient Sample (NIS) to evaluate the influence of hospital teaching status on patient outcomes following colon resection for colon cancer. The study concluded that mortality rates were higher among patients who underwent the procedure at teaching hospitals, and length of stay was also longer for these patients. However, there was no statistically significant difference in the total cost of hospitalization [8].

The considerable mortality rates may be linked to various factors. Non-teaching healthcare facilities frequently lack the sophisticated levels of care, training infrastructure, post-operative support, and resources necessary for managing intricate cases and adverse complications effectively. As a consequence, numerous complex and critically ill patients are transferred to tertiary and quaternary care hospitals, contributing to the heightened mortality rates and increased resource utilization. However, it is crucial to recognize that teaching hospitals may also confront their own set of challenges. For example, they have residents and fellows who are still in the process of being trained. Although experienced professionals supervise them directly, these trainees may possess some autonomy in decision-making, which could potentially result in oversights or errors in patient care management. Teaching hospitals, on the other hand, also possess a significant advantage due to their vast resources, specialized medical expertise, and close supervision by medical students, on-site residents, and fellows. This active involvement in patient care leads to a decline in the frequency and severity of adverse outcomes. Our study revealed that teaching hospitals had lower blood transfusion rates, anemia, pneumonia, and acute coronary syndrome than non-teaching hospitals. Furthermore, teaching hospitals are better equipped to manage various surgical interventions, which are inherently complicated and require extensive resources.

In 1984, Brennan TA et al. conducted a study on 521 New York State hospitals, which involved 31,429 admissions. The purpose of the study was to analyze the incidence of adverse events in teaching hospitals versus non-teaching hospitals. The findings revealed that the odds of adverse events were notably higher in teaching hospitals compared to non-teaching hospitals. It was found that this disparity could be attributed to the complex health conditions encountered in teaching facilities, rather than negligence. Additionally, it was noted that negligent events were less frequent in teaching hospitals when compared to their counterparts in non- teaching institutions [9]. In a manner similar to this study, Thomas EJ et al. carried out an extensive examination of 14,700 hospital admissions in Utah and Colorado from 1992. The primary objective of this analysis was to evaluate the incidence and risk of adverse events, which encompassed those that were preventable or resulted from delayed or incorrect diagnosis, as well as complications related to procedures. The results of this investigation indicated no statistically significant distinction in the risk of these occurrences between teaching and non-teaching hospitals during the period in question [10].

A substantial body of literary sources, spanning historical and contemporary works, has explored the deleterious consequences and their extensive implications in both teaching and non-teaching hospitals [11,12]. Our study has thoroughly employed the most recent data from the NIS to evaluate outcomes and mortality rates in a comprehensive manner, drawing upon a vast array of information. This in-depth methodology is anticipated to exert a profound influence on future healthcare policies and enhance patient care across both types of hospitals.

Although the National Inpatient Sample (NIS) is a widely utilized source of hospitalization data in the United States, it is crucial to acknowledge its inherent limitations. The NIS database does not include information on subjective patient complaints, specific laboratory and diagnostic imaging results, or details about treatment regimens, such as cancer staging. Moreover, variations in data collection methods among hospitals contribute to potential gaps in the information available. Furthermore, the NIS only focuses on inpatient care and excludes outpatient services and readmissions, limiting the comprehensive assessment of long-term complications and fatalities. In addition, inpatient data does not provide insights into critical events during surgery or complications that may affect length of hospital stays and impact costs. Therefore, further prospective studies would be necessary to thoroughly validate these findings

Conclusion

The study revealed no significant difference in mortality rates between teaching and non-teaching hospitals. However, patients in teaching hospitals were more susceptible to the development of sepsis, acute respiratory failure, ICU admission, mechanical ventilation, and increased healthcare resource utilization. On the other hand, they were less likely to develop anemia, pneumonia, and acute coronary syndromes. Teaching hospitals benefit from greater resources and expertise but may face challenges due to trainee decision-making. This comprehensive analysis is expected to have a far-reaching impact on future healthcare policies and improve patient care in both hospitals. Nevertheless, further prospective studies are required to authenticate the findings of this study.

References

1. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. (2015). Global cancer statistics, 2012. CA Cancer J Clin, 65(2):87-108.
2. Siegel R, Ma J, Zou Z, Jemal A. (2014). Cancer statistics, 2014. CA Cancer J Clin, 64(1):9-29.
3. Singh H, Thomas EJ, Petersen LA, Studdert DM. (2007). Medical Errors Involving Trainees: A Study of Closed Malpractice Claims From 5 Insurers. *Arch Intern Med,* 167(19):2030-2036.
4. Galindo-Utrero A, San-Román-Montero JM, Gil-Prieto R, Gil-de-Miguel Á. (2022). Trends in hospitalization and in-hospital mortality rates among patients with lung cancer in Spain between 2010 and 2020. BMC Cancer, 22(1):1199.
5. Meguid RA, Brooke BS, Chang DC, Sherwood JT, Brock MV, Yang SC. (2008). Are surgical outcomes for lung cancer resections improved at teaching hospitals? Ann Thorac Surg, 85(3):1015-1024.
6. Dimick JB, Cowan JA Jr, Colletti LM, Upchurch GR Jr. (2004). Hospital teaching status and outcomes of complex surgical procedures in the United States. Arch Surg, 139(2):137-141.
7. Chaudhry H, Sohal A, Dhaliwal A, et al. (2022). Effect of Hospital Teaching Status on Outcomes of Patients with Acute Pancreatitis. Cureus, 14(12):32263.
8. Hayanga AJ, Mukherjee D, Chang D, Kaiser H, Lee T, Gearhart S, Ahuja N, Freischlag J. (2010). Teaching hospital status and operative mortality in the United States: tipping point in the volume-outcome relationship following colon resections? Arch Surg, 145(4):346-350.
9. Brennan TA, Hebert LE, Laird NM, Lawthers A, Thorpe KE, Leape LL, Localio AR, Lipsitz SR, Newhouse JP, Weiler PC, Hiatt HH. (1991). Hospital Characteristics Associated with Adverse Events and Substandard Care. *Journal of the American Medical Association,* 265:3265-3269.
10. Thomas EJ, Orav EJ, Brennan TA. (2000). Hospital Ownership and Preventable Adverse Events. *Journal of General Internal Medicine,* 15:211-219.
11. Burke LG, Frakt AB, Khullar D, Orav EJ, Jha AK. (2017). Association Between Teaching Status and Mortality in US Hospitals. *JAMA,* 317(20):2105-2113.
12. Simunovic M, Rempel E, Theriault ME, et al. (2006). Influence of hospital characteristics on operative death and survival of patients after major cancer surgery in Ontario. Can J Surg, 49:251-258.

Cite this article: Javaid S, Frasier K, Carll O, Vivian L, Loperfito A. (2024). Comparing HealthCare Standards: Hospital Teaching Status and Lung Cancer Patient Hospitalizations. *Journal of Cancer Management and Research*, BioRes Scientia Publishers. 2(1):1-8. DOI: 10.59657/2996-4563.brs.24.009

Article History: **Received:** December 30, 2023; **Accepted:** January 16, 2024; **Published:** January 25, 2024