RESEARCH

Does Obesity Cost the Patient and the Hospital? Increased Thirty-Day Readmission and Resource Utilization Among Obese Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease: A Propensity Score Match Analysis

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Determine the relationship between obesity and thirty-days readmission, mortality, morbidity, and health care resource utilization in patients admitted to hospitals in the in the United States with acute exacerbation of chronic obstructive pulmonary disease (AE-COPD).

Keywords: obesity; readmission; pulmonary Disease

Purpose

To determine the relationship between obesity and thirty-days readmission, mortality, morbidity, and health care resource utilization in patients admitted to hospitals in the in the United States with acute exacerbation of chronic obstructive pulmonary disease (AE-COPD).

Method

A retrospective study was conducted using the AHRQ-HCUP Nationwide Readmission Database for the year 2014. Adults (≥18 years) with a primary diagnosis of AE-COPD, along with a secondary diagnosis of obesity were identified using ICD-9 codes as described in the literature [1, 2]. The primary outcome was the rate of all-cause readmission within 30 days of discharge. Secondary outcomes were reasons for readmission, readmission mortality rate, morbidity, and resource use (length of stay and total hospitalization costs and charges). Propensity score (PS) using the 1:1 nearest neighbor matching without replacement was utilized to adjust for confounders [3]. Independent risk factors for readmission were identified using a Cox proportional hazards model [4].

Results

In total, 1.5 million hospital admissions among adults with a primary and secondary diagnosis of AE-COPD were identified, of which 14.6% were obese. After PS matching with similar demographic (age, gender, hospital status, etc.) and clinical characteristics (Charlson comorbidity score), 497,897 obese AE-COPD patients were paired with 497,897 non-obese AE-COPD patients. The 30-day rate of readmission among obese and non-obese with AE-COPD were 12.2% and 12.1% ($p < 0.001$). The most common readmission for both groups was sepsis (20.5%).

During the index admission for AE-COPD, the length of stay (LOS) among obese patients was significantly longer than the non-obese counterparts (5.1 vs 4.3 days, $p < 0.001$). Furthermore, the total cost for the obese patients was more ($10,192 vs $8,889, $p < 0.001$). Most importantly, obese patients' in-hospital mortality rate during their index admission was significant higher (1.18% vs 0.21%, $p < 0.001$).

Amongst those readmitted, obese patients similarly had a significant longer length of stay (LOS) than their non-obese counterparts (5.9 vs 4.9 days, $p < 0.001$) and their total cost for the readmission was more expensive ($12,581 vs $10,419, $p < 0.001$). Lastly, obese patients' in-hospital mortality rate during their readmission was significant higher (2.89 % vs 0.41%, $p < 0.001$).

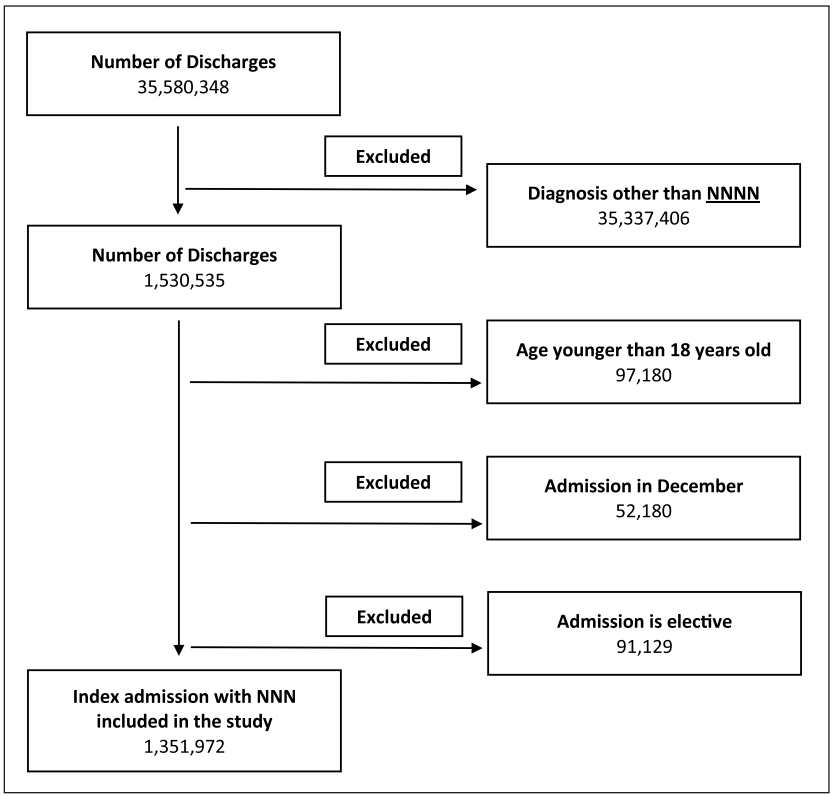

Figure 1.

Table 1: Patients and Hospitals Characteristics after Propensity Match.

Variables		Obese Patients	Non-Obese Patients	P-value
Age		55.867	55.91	0.006
Gender				0.54
	Female	63.4	63.37	
	Male	36.6	36.63	
Insurance				0.8022
	Medicaid	19.33	19.32	
	Private	30.96	31.01	
	Self pay	3.67	3.63	
Median household income				
	$1–$39,999	27.36	27.36	0.468
	$40,000–$50,999	23.35	23.34	
	$51,000–$65,999	19.35	19.33	
	$70,000+	22.33	22.54	
Ownership of hospital				0.661
	Government	73.29	73.35	
	Private	15.35	15.33	
Hospital urban-rural				0.001
	Urban	33.49	33.46	
	Rural	4.82	4.77	
	Others	1.3	1.25	
Teaching status of hospital				0.079
	Teaching	63.65	63.71	

(Contd.)

Variables		Obese Patients	Non-Obese Patients	P-value
	Non-teaching	6.12	6.03	
Hospital bed-size				0.048
	Small	14.65	14.57	
	Medium	29.02	29.02	
	Large	56.33	56.41	
Charlson comorbidity index				0.761
	1	23.22	23.21	
	2	17.01	16.97	
	3	32.45	32.47	

Table 2: Index admission for Acute Exacerbation of COPD after Propensity Match.

Variables	Obese Patients	Non-Obese Patients	P-value
Length of Stay	5.06 (5.00–5.12)	4.36 (4.26–4.46)	0.001
Total Hospital Cost	$10,192 (10,007–10,378)	$8,889 (8,623–9,156)	0.001
Mortality	2,303 (2,105–5,501)	420 (350–489)	0.001

Table 3: Readmission for Acute Exacerbation of COPD after Propensity Match.

Variables	Obese Patients	Non-Obese Patients	P-value
Length of Stay	5.93 (5.78–6.08)	4.97 (4.65–5.09)	0.001
Total Hospital Cost	$12,581 (12,193–12,969)	$10,419 (9,573–11,265)	0.001
Mortality	685 (588–782)	99 (68–130)	0.001

Table 4: Independent Predictors for 30-day Readmission using Propensity Matching.

Variables	Adjusted Hazard Ratio	95% Confidence Interval	P-value
Atrial Fibrillation	1..45	1.37–1.53	0.001
Acute Respiratory Failure	1.20	1.14–1.26	0.001
Acute Kidney Injury	1.33	1.26–1.40	0.001
O2 requirement	1.42	1.35–1.51	0.001
Obesity	1.08	1.01–1.15	0.02
Non-Obesity	0.92	0.86–0.98	0.02

Table 5: The Most Common 5 Principal Diagnosis for Readmission.

Diagnosis	ICD-9	Percentage (%)
Pneumonia, organism unspecified	486	46.55%
Obstructive chronic bronchitis with (acute) exacerbation	491.21	30.29%
Obstructive chronic bronchitis with acute bronchitis	491.22	8.07%
Influenza with other respiratory manifestations	187.1	2.19%
Unspecific bacteria Pneumonia	482.9	1.89%
Influenza with pneumonia	487.0	1.89%

Obesity (HR 1.11, CI 1.06–1.16, $p < 0.001$) was an independent predictor associated with higher risks of readmission. Other medical comorbidities also increased risk of readmission, including atrial fibrillation, acute respiratory failure, acute kidney injury, in-hospital oxygen requirement.

Conclusion

In this study, obese patients admitted with AE-COPD have a higher 30 days of readmission rate, LOS, total hospital cost, and in-hospital mortality ($p < 0.001$) than their non-obese counterparts.

References

1. **Xiao X, He J, Ruan Y, He Q, Gao Y, Zhai Y, Wu C,** et al. Prevalence of atrial fibrillation in hospital encounters with end-stage chronic obstructive pulmonary disease on home oxygen: National trends in the United States. *Chest*, 2019 February; 1–10. DOI: https://doi.org/10.1016/j.chest.2018.12.021
2. **Abougergi MS, Peluso H, Mrad C, Saltzman JR.** The Impact of Obesity on Mortality and Other Outcomes in Patients With Nonvariceal Upper Gastrointestinal Hemorrhage in the United States. *Journal of Clinical Gastroenterology*. 2019; 53(2): 114–119. DOI: https://doi.org/10.1097/MCG.0000000000000942
3. **Mujib M, Khanna N, Mazumder NK, Aronow WS, Kolte D, Khera S, Palaniswamy C, Jain D, Lanier GM, Sule S, Ahmed A, Levy WC.** Pretransplant Coagulopathy and In-hospital Outcomes Among Heart Transplant Recipients: A Propensity-Matched Nationwide Inpatient Sample Study. *Clinical Cardiology*. 2015; 38(5): 300–308. DOI: https://doi.org/10.1002/clc.22391
4. **Abougergi MS, Peluso H, Saltzman J.** Thirty-Day Readmission Among Patients with Non-Variceal Upper Gastrointestinal Hemorrhage and Effects on Outcomes. *Gastroenterology*. 2018; 155: 38–46. DOI: https://doi.org/10.1053/j.gastro.2018.03.033
5. **Tapson VF.** The Role of Smoking in Coagulation and Thromboembolism in Chronic Obstructive Pulmonary Disease. *Proceedings of the American Thoracic Society*. 2005; 2(1): 71–77. DOI: https://doi.org/10.1513/pats.200407-038MS
6. **Bickerstaffe G.** Smoking cessation for hospital inpatients. *BMJ Quality Improvement Reports*. 2014; 3(1): u204964.w2110. DOI: https://doi.org/10.1136/bmjquality.u204964.w2110

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