Effect of Obesity on Hospital Outcomes and Readmissions in Multiple Myeloma: A Propensity-Matched Analysis of the National Readmission Database (2018–2020)

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Introduction

Multiple myeloma (MM) is a malignancy of plasma cells in the bone marrow. Obesity, a prevalent public health concern, is associated with chronic inflammation and immune dysregulation. With the rising prevalence of obesity in our community, we aim to evaluate the influence of obesity on hospitalization outcomes and readmissions in patients with MM.

Methods

We conducted a retrospective analysis using the National Readmission Database (2018–2020), including adults (>18 years of age) admitted for MM. Patients were stratified based on obesity status. Primary outcomes were inpatient mortality and 30-day all-cause readmission. Secondary outcomes included length of stay (LOS), total hospitalization charges, and complications such as anemia, hypercalcemia, tumor lysis syndrome, acute kidney injury (AKI), and sepsis. Multivariate regression was used to adjust for confounders. To further address the biases, propensity score matching was performed using baseline covariates to reduce bias. Statistical significance was set at $P<0.05$.

Results

Among 34,969 patients admitted with MM, 3845 (11%) were obese. Obesity was associated with a significantly lower inpatient mortality rate (adjusted odds ratio [aOR]: 0.75; $P=0.016$). However, obese patients experienced higher rates of inpatient complications including AKI (aOR: 1.28; $P<0.001$) and anemia (aOR: 1.11; $P=0.03$) compared with non-obese patients. Hospital resource utilization was greater in the obese cohort, with increased LOS (adjusted coefficient [aCoeff]: 1.05 days; $P<0.001$) and total hospitalization charges (aCoeff: $17,946; $P<0.001$). Rates of sepsis, tumor lysis syndrome, and hypercalcemia were not significantly different. The most common causes of readmission were: MM not achieving remission (36%), sepsis (20%), acute kidney failure (11%), chemotherapy encounters (8%), and MM relapse (8%). Independent predictors of 30-day readmission included age (aOR: 0.99; $P<0.01$), hypertension (aOR: 1.11; $P=0.02$), congestive heart failure (aOR: 1.31; $P<0.001$), insurance type, and hospital teaching status.

Demographic Charteristics

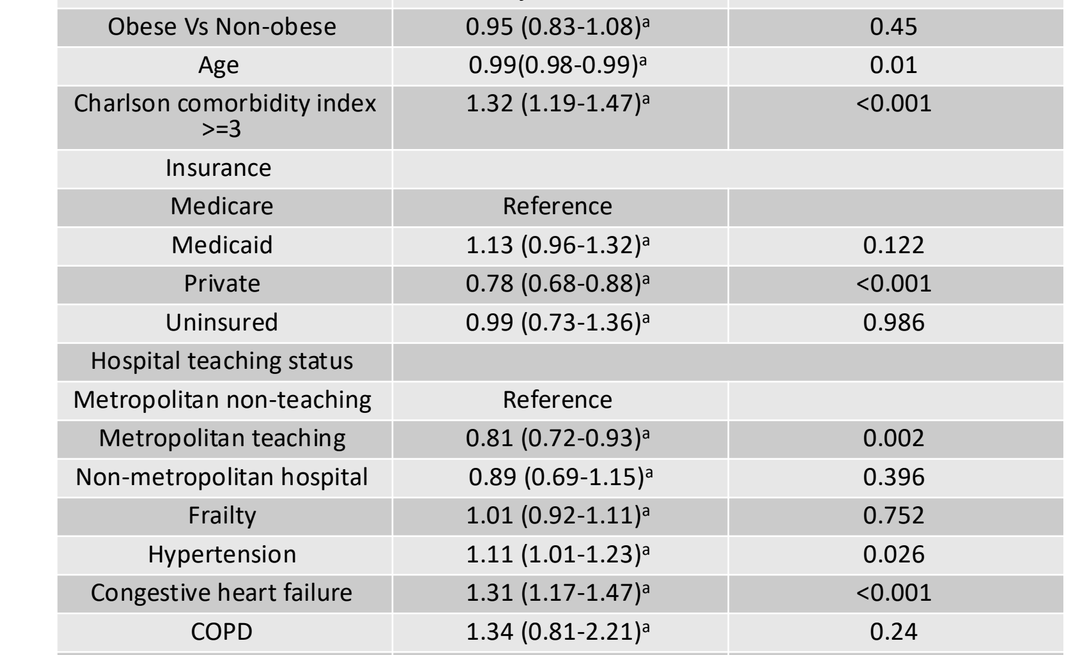
Multiple myeloma index admission (n=34969)			
Variable	Obese(n=3845)	Non obese (n=31123)	P-value
Age	64.59	67.68	<0.001
Female (%)	53.07	43.76	<0.001
Male (%)	46.07	56.24	<0.001
Insurance (%)			0.0006
Medicare	57.16	61.5	
Medicaid	11.01	9.36	
Private	30.55	27.33	
Uninsured	1.28	1.81	
Charlson Comorbidity Index (%)			NA
0	0	0	
1	0	0	
2	19.17	31.16	
3 or more	80.83	68.84	
Median income in patients zipcode (%)			<0.001
$1 – 49,999	28.43	27.71	
$50,000 – 64,999	30.77	25.40	
$65,000 – 85,999	23.42	24.78	
$86,000+	17.38	22.12	
Hospital bed size (%)			0.05
Small	12.73	10.66	
Medium	22.04	21.82	
Large	65.24	67.53	
Hospital Teaching status (%)			0.72
Metropolitan non-teaching	12.38	12.47	
Metropolitan teaching	84.36	83.89	
Non-metropolitan hospital	3.26	3.63	
Frailty(%)	26.98	35.60	<0.001
Home discharge with or without home health aid (%)	72.39	74.98	0.018
Short term hospital discharge (%)	1.39	1.15	0.315
Skilled nursing facility and other discharge	20.78	17.04	0.0001

Outcomes

Outcomes			
	Obese	Non obese	P value
Mortality (%)	4.50	5.94	0.01
Adjusted OR	0.82 (0.65-1.03)[a]		0.102
Propensity matched OR	0.755 (0.60-0.94)[a]		0.016
All cause Readmission (%)	16.83	16.94	0.908
Adjusted OR	0.94 (0.82-1.07)[a]		0.391
Propensity matched OR	0.98(0.86-1.12)[a]		0.845
LOS (days)	8.15	6.73	<0.001
Adjusted coefficient (days)	1.42(0.86-1.97)[a]		<0.001
Propensity matched coefficient (days)	1.05(0.95-2.05)[a]		<0.001
Total charges ($)	113977	98631	0.001
Adjusted Coefficient ($)	15346(6546-24146)[a]		0.001
Propensity matched coefficient ($)	17946(9509-263883)[a]		<0.001
Hypercalcemia (%)	31.42	28.97	0.038
Adjusted OR	1.13 (1.01-1.27)[a]		0.028
Propensity matched OR	1.10 (0.98-1.23)[a]		0.082
Anemia (%)	52.75	49.25	0.006
Adjusted OR	1.11 (1.001-1.233)[a]		0.047
Propensity matched OR	1.11(1.005- 1.232)[a]		0.039
Tumor lysis syndrome (%)	2.90	2.54	0.358
Adjusted OR	1.07(0.79-1.44)[a]		0.650
Propensity matched OR	1.16 (0.87-1.54)[a]		0.309
AKI (%)	53.11	46.71	<0.001
Adjusted OR	1.28 (1.15-1.43)[a]		<0.001
Propensity matched OR	1.28(1.15-1.43)[a]		<0.001
Sepsis (%)	1.67	1.96	0.396
Adjusted OR	0.76 (0.51-1.14)[a]		0.192
Propensity matched OR	0.87(0.59-1.27)[a]		0.481
a=95% confidence interval			

Predictors of 30 days Readmission

Predictors of 30 day All cause readmission for Multiple myeloma		
Variable	Adjusted OR	P value
Obese Vs Non-obese	0.95 (0.83-1.08)[a]	0.45
Age	0.99(0.98-0.99)[a]	0.01
Charlson comorbidity index >=3	1.32 (1.19-1.47)[a]	<0.001
Insurance		
Medicare	Reference	
Medicaid	1.13 (0.96-1.32)[a]	0.122
Private	0.78 (0.68-0.88)[a]	<0.001
Uninsured	0.99 (0.73-1.36)[a]	0.986
Hospital teaching status		
Metropolitan non-teaching	Reference	
Metropolitan teaching	0.81 (0.72-0.93)[a]	0.002
Non-metropolitan hospital	0.89 (0.69-1.15)[a]	0.396
Frailty	1.01 (0.92-1.11)[a]	0.752
Hypertension	1.11 (1.01-1.23)[a]	0.026
Congestive heart failure	1.31 (1.17-1.47)[a]	<0.001
COPD	1.34 (0.81-2.21)[a]	0.24
Coronary artery disease	1.09 (0.97- 1.23)[a]	0.135
Diabetes mellitus	0.98 (0.85-1.13)[a]	0.855
Transient ischemic attack	1.02 (0.83-1.25)[a]	0.823
Cerebro-vascular accident	1.08 (0.84-1.38)[a]	0.524
a=95% confidence interval		



Graphical Representation of predictors of 30 days readmission

Conclusion

Although inpatient mortality may be lower in obese patients with MM, they experience significantly higher rates of complications—such as AKI and anemia—as well as longer hospital stays and greater total hospitalization costs compared with non-obese patients. These findings highlight the complex role of obesity in MM outcomes and underscore the need for further investigation to validate and extend these results.