Clinical Outcomes and Mortality Predictors in Multiple Myeloma Hospitalizations with COVID-19 Infection

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Introduction

- Infections are a leading cause of mortality in patients with multiple myeloma (MM).
- While chemotherapy-induced neutropenia is a major contributor, other immunologic impairments—such as impaired lymphocyte activity, suppression of normal plasma cell function, and hypogammaglobulinemia—also play significant roles.
- Some studies have shown increased in-hospital mortality of MM patients with COVID-19 infection but there has been limited analysis of the predictive factors.

Objective

- We examined the predictors of in-hospital mortality among MM hospitalization with COVID-19 infection.

Design and Setting

- Healthcare Cost and Utilization Project-National Inpatient Sample (HCUP-NIS) (2020-2022) was queried to identify adult (aged ≥ 18 years) hospitalizations with a primary diagnosis of MM.
- The cohort was dichotomized based on the presence of COVID-19 infection.

Main Outcomes Measures

- The primary outcomes studied were in-hospital mortality, length of stay, and hospital charges.
- Predictors of mortality were evaluated among MM-COVID-19 population.
- Multivariable logistic and linear regression models were performed, adjusting patient characteristics to evaluate outcomes

Results

- Among 59,775 MM hospitalizations, 1,165 (1.9%) had concomitant COVID-19 infection.
- Patients with MM and concurrent COVID-19 infection had four-fold higher odds of in-hospital mortality [adjusted odds ratio (aOR) 4.25, p < 0.001] and were 40% more likely to have prolonged hospital stays (> 5 days) [aOR 1.39, P=0.04].
- There was a tendency towards higher hospitalization costs in the COVID-19 cohort, however, it was not significant [β Coefficient: $38,575, P=0.06].
- Significant predictors of mortality in MM patients with COVID-19 infection included presence of severe sepsis (aOR: 27.7, p<0.001), electrolyte abnormalities (aOR: 7.45, p<0.001), protein energy malnutrition (aOR: 3.03, p=0.004), and arrythmias (aOR: 3.38, p=0.005).

Table 1: Predictors of Mortality among Multiple Myeloma Hospitalizations with COVID-19 infection

Variables	Unadjusted		Adjusted⁺	
	Odds Ratio (95% Confidence Interval)	P-value	Odds Ratio (95% Confidence Interval)	P-value
Severe Sepsis	**24.29 (9.35-63.08)**	**<0.001**	**27.74 (9.68-79.5)**	**<0.001**
Electrolyte abnormalities	**7.61 (2.63-21.97)**	**<0.001**	**7.45 (2.60-21.38)**	**<0.001**
Protein Energy Malnutrition	**2.94 (1.38-6.25)**	**0.005**	**3.03 (1.41-6.50)**	**0.004**
Obesity	1.68 (0.62-4.54)	0.31	1.88 (0.66-5.40)	0.24
Diabetes	1.80 (0.85-3.83)	0.12	1.75 (0.76-4.03)	0.19
Dyslipidemia	1.36 (0.66-2.81)	0.41	1.37 (0.63-2.95)	0.43
Hypertension	0.91 (0.40-2.05)	0.81	0.77 (0.33-1.80)	0.54
Coronary artery Disease	0.75 (0.25-2.30)	0.62	0.86 (0.26-2.81)	0.80
Congestive Heart Failure	1.92 (0.74-4.96)	0.18	2.17 (0.82-5.77)	0.12
Arrythmia	**2.77 (1.24-6.21)**	**0.013**	**3.38 (1.43-7.98)**	**0.005**
Stroke	0.91 (0.11-7.82)	0.93	0.90 ()0.09-9.43	0.93
COPD	1.10 (0.30-4.01)	0.88	1.21 (0.32-4.49)	0.78
Chronic Liver Disease	2.61 (0.92-7.40)	0.07	2.50 (0.92-6.81)	0.07
Chronic Kidney Disease	1.11 (0.54-2.29)	0.77	1.18 (0.52-2.61)	0.71
Acute VTE	2.14 (0.55-8.38)	0.27	2.17 (0.51-9.20)	0.3

⁺ Adjusted for age, gender, and race

Conclusion

- Our analysis demonstrated significantly higher odds of in-hospital mortality in MM hospitalizations with COVID-19.
- Predictors of mortality such as severe sepsis, electrolyte abnormalities, protein energy malnutrition and arrythmia, which have not been previously studied in MM with COVID-19, were also identified.
- More studies are needed to compare the significance of these predictors in MM patients with and without COVID-19.
- The findings also buttress the need for close monitoring of patients and prompt intervention on identification of these predictors in addition to control of commonly associated chronic co-morbidities of MM.

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