IDENTIFICATION OF PREDICTIVE FACTORS FOR SEVERE INFECTIONS IN MULTIPLE MYELOMA: A RISK MODEL DEVELOPMENT AT A TERTIARY CARE CENTER

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INTRODUCTION

Despite remarkable therapeutic advances, infectious complications represent a leading cause of morbidity and non-relapse mortality in Multiple Myeloma (MM). This vulnerability stems from disease-related inmune dysfunction, cumulative immunosuppression from sequential therapies and host factors.

As survival improves and treatment strategies become increasingly complex, identifying high risk patients for severe infections remains a critical challenge, limited by a lack of objective, biomarker – based predictive tools beyond mere clinical judgment.

AIM

To identify predictive factors of severe infection by assessing the baseline clinical and microbiological characteristics of Multiple Myeloma patients treated at a tertiary care hospital.

METHODS

- **Study design:** Observational, retrospective and cross-sectional study.
- **Setting**: Tertiary care referral center, Centro Medico ABC, Mexico City, Mexico.
- **Patients:** 75 patients with confirmed MM hospitalized between January 2023 and December 2024.
- **Primary outcome:** Severe infection (CTCAE grade ≥4, version 5.0).
- **Statistical analysis:** Univariable and multivariable logistic regression were used to assess associations (OR). CRP discrimination was evaluated by ROC analysis (AUC), and model performance by Nagelkerke R^2.

CONCLUSIONS

In this cohort, elevated CRP (>12.45 mg/L) combined with febrile neutropenia at presentation were independent predictors of severe infection. This highly specific (96.8%) and accurate (85%) clinical-biochemical combination offers an accessible framework to address current gaps in Latin American practice, refine clinical decision-making and optimizing high-risk patient care.

RESULTS

A total of 75 patients were included (mean age: 73.0 ± 11.3 years; 73.3% male), 17.3% (n=13) developed severe infection (SI). At infection onset, 50.7% were receiving antimicrobial prophylaxis. Pneumonia (42.7%) and blood stream infection (31.0%) were the most common clinical manifestations. D-VRd was the most frequent regimen (33.3%). Lenalidomide was associated with higher frequency of SI (p=0.028).

SI was associated with higher creatinine levels (1.74 vs 1.13 mg/dl, $p < 0.001$) and C-reactive protein (CRP) levels (21.86 vs 5.51 mg/L, p =0.0035).

Febrile neutropenia (OR 8.04, 95% CI 1.76 - 36.64; p=0.007) and CRP > 12.45 mg/L (OR 9.77, 95% CI 2.19 – 43.70; p=0.003) independently predicted SI. CRP show moderate discrimination (AUC 0.762). The model achieved 30.8% sensitivity, 96.8% specificity, and 85.0% overall accuracy (Nagelkerke R^2 = 0.290).

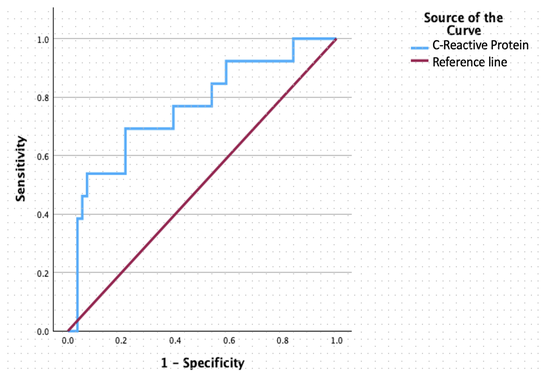
Table 1. Comparison of regimens for severe infection*

Treatment	Without severe infection	Severe infection	*p*
D-VRd	20 (32.3%)	5 (38.5%)	0.68
D-Rd	23 (37.1%)	7 (53.8%)	0.28
VRd	30 (48.4%)	8 (61.5%)	0.40
KRd	17 (27.4%)	4 (30.8%)	0.81
VCd	4 (6.5%)	2 (15.4%)	0.30
CRd	3 (4.8%)	3 (23.1%)	**0.028**[1]
PCd	4 (6.5%)	2 (15.4%)	0.30
KCd	4 (6.5%)	2 (15.4%)	0.30
Isa-VRd	0 (0.0%)	0 (0.0%)	—
Other	10 (16.1%)	0 (0.0%)	0.18

[1] The only significant comparison in the SPSS proportion comparisons with Bonferroni correction (p = 0.028).

*Data are presented as n (%). Comparisons between patients with and without severe infection were performed using Pearson's χ^2 or Fisher's exact test, as appropriate. Multiple comparisons of proportions were adjusted using the Bonferroni correction.

Figure 2. ROC curve*



***CPR > 12.45 mg/L (OR 9.77,p=0.003)**

Area under the curve 0.762

Table 2. Multivariable logistic regression*

Independent predictor	OR	95% CI	*p*
Febrile neutropenia	8.04	1.76 -36.64	0.007
CRP> 12 mg/L	9.77	2.19 – 43.70	0.003

***Final model performance**

Sensitivity 30.8% | Specificity 96.8% | Accuracy 85%
Nalgelkerke R^2 = 0.290

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