Organ Support and Severity Indices as Predictors of Mortality in Hospitalized Multiple Myeloma Patients: Evidence from the MIMIC-IV Critical Care Database

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CONTEXT

Multiple myeloma is a leading cause of hematologic malignancy requiring ICU admission for critical illness; however, data on prognostic factors in this setting remain limited.

OBJECTIVE

To evaluate clinical characteristics and identify predictors of ICU and in-hospital mortality among patients with multiple myeloma using the MIMIC-IV database.

METHODOLOGY

This retrospective study utilized the MIMIC-IV v3.1 database, containing ICU patient data from Beth Israel Deaconess Medical Center (2008–2019). Adult ICU patients with multiple myeloma were identified via ICD-10 codes (C90.*). Mortality was analyzed using binary logistic regression in SPSS v26, with Chi-square for categorical variables and the Mann-Whitney U test for continuous data.

MAIN OUTCOMES MEASURES

Composite mortality, including in-hospital, 1-year, and long-term mortality. Comparisons between survivors and non-survivors were conducted for ventilation status, dialysis use, positive cultures, sepsis at admission, baseline clinical status, and laboratory parameters.

KEYWORDS

Multiple Myeloma, ICU Mortality, MIMIC-IV

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RESULTS

Among 331 multiple myeloma patients (mean age 71.8 years; 128 females, 203 males; 60.7% White), 49.8% required supplemental oxygen and 33.2% received high-flow nasal cannula ventilation. The in-hospital survival rate was 66.2%, with 45 female and 67 male deaths. Dialysis was used in 91.5% of non-survivors versus 8.5% of survivors ($p < 0.001$). Vasoactive support was used in 76.7% of non-survivors compared to 23.3% of survivors ($p = 0.008$). Positive cultures were identified in 182 patients, 80.2% of which occurred in non-survivors ($p = 0.034$). Mann-Whitney U tests showed that non-survivors had higher maximum BUN ($U=9364$, $p = 0.001$), creatinine ($U=9246$, $p < 0.001$), WBC ($U=9669$, $p = 0.003$), and absolute neutrophil count ($U=4625$, $p = 0.03$), with lower platelet nadirs ($U=9796$, $p = 0.003$). SOFA scores differed significantly between survivors and non-survivors (likelihood ratio $\chi^2=31.358$, $df=20$, $p = 0.04$). Logistic regression ($n=72$) identified APS III score ($B=0.289$, $p = 0.05$) and ventilation status ($B=–4.111$, $p = 0.037$) as independent predictors of mortality. Race was significantly associated with long-term mortality ($\chi^2=36.428$, $df=19$, $p = 0.009$).

CONCLUSION

Short-term prognosis in ICU-admitted multiple myeloma patients was primarily driven by infection, organ failure severity, and need for advanced respiratory or circulatory support.