Escalation-of-Care Phenotypes and Progressive Inpatient Deterioration in Acute Myeloid Leukemia: A National Inpatient Sample Analysis

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INTRODUCTION

Patients hospitalized with acute myeloid leukemia (AML) frequently experience progressive deterioration requiring escalating supportive and critical care interventions. However, national escalation-of-care phenotypes and associations with mortality and healthcare utilization remain poorly characterized in malignant hematology.

METHOD

A survey-weighted analysis of the National Inpatient Sample (2016–2023) was conducted among adult AML hospitalizations identified using ICD-10-CM codes for AML not in remission or relapse (C92.0*). Escalation-of-care phenotypes were categorized hierarchically as AML without sepsis, AML with sepsis, AML with single organ failure, AML with multiorgan failure, AML requiring ICU-level intervention, and AML with cardiac arrest. Organ failure domains included acute kidney injury, respiratory failure, shock, disseminated intravascular coagulation, hepatic failure, encephalopathy, and cardiac arrest. ICU-level intervention burden was defined by invasive mechanical ventilation, dialysis-related procedures, tracheostomy, or cardiac arrest. Primary outcome was in-hospital mortality. Secondary outcomes included length of stay (LOS), hospitalization charges, and cost.

RESULTS

The weighted cohort comprised 486,490 AML hospitalizations (unweighted n=97,298). Sepsis occurred in 19.6% of hospitalizations, multiorgan failure in 31.7%, ICU-level intervention burden in 18.0%, and cardiac arrest in 3.0% (all $p<0.001$). Mortality progressively escalated across deterioration phenotypes: AML without sepsis 1.5%, AML with sepsis 4.7%, AML with single organ failure 8.5%, AML with multiorgan failure 28.4%, AML requiring ICU-level intervention 67.6%, and AML with cardiac arrest 75.5% (all $p<0.001$). Mean LOS increased stepwise from 9.7 days among AML hospitalizations without sepsis to 19.0 days among those requiring ICU-level interventions ($p<0.001$). Mean hospitalization charges similarly increased from $120,800 to $393,844 ($p<0.001$). Temporal trend analyses demonstrated decreasing ICU-level intervention burden over time (OR 0.98/year, 95% CI 0.96–0.99, $p=0.001$) despite increasing multiorgan failure burden (OR 1.05/year, 95% CI 1.04–1.06, $p<0.001$).

CONCLUSIONS

AML hospitalizations demonstrate a graded escalation-of-care cascade characterized by worsening organ failure burden, resource utilization, and mortality. Escalating deterioration phenotypes identify high-risk inpatient AML populations and provide a scalable framework for inpatient risk stratification and supportive care optimization in malignant hematology.

REFERENCES

1. Agency for Healthcare Research and Quality. (2016-2023). *National Inpatient Sample (NIS).* Healthcare Cost and Utilization Project (HCUP), U.S. Department of Health and Human Services.