# Gender Differences in Transfusion Needs and In-Patient Mortality in Acute Leukemia: National Inpatient Sample 2016-2020

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## Introduction

Gender-based differences in cancer biology and treatment response have been recognized across malignancies. However, data on sex differences in transfusion needs, mortality, and inpatient outcomes in acute leukemia remain scarce. This study investigates whether gender influences transfusion requirements and clinical outcomes in hospitalized adults with acute leukemia.

## Significance and Innovation

Prior work in critical care and solid tumors suggests that female patients may have survival advantages despite similar treatment intensities. However, only a limited number of studies have examined sex-specific differences in hematologic cancers.

This study will provide a comprehensive inpatient analysis of sex-based transfusion needs and outcomes in acute leukemia to date. The results may prompt sex-specific supportive care strategies and mechanistic investigations into treatment response disparities.

## Methods

A survey-weighted cross-sectional analysis of the 2016-2020 National Inpatient Sample identified adult (≥18 y) acute-leukemia admissions by ICD-10-CM codes. Sex (reference = male) was the primary exposure. Outcomes included receipt of any red-blood-cell or platelet transfusion (primary) and in-hospital death; secondary outcomes were sepsis, tumour-lysis syndrome (TLS), prolonged length-of-stay (LOS > 75th percentile) and inflation-adjusted total charges.

Multivariable logistic (binary outcomes) and log-linked gamma (charges) models adjusted for demographics, payer, hospital characteristics, frailty and malnutrition; results are reported as adjusted odds ratios (aOR) or β-coefficients with 95 % confidence intervals (CI).

## Results

Among an estimated 520 215 admissions, 43.9 % were women. Transfusion support was required in roughly one-fifth of encounters and did not differ by sex (women 19.7 % vs men 19.5 %; aOR 1.02, CI 0.98–1.05; P = 0.34).

Women experienced consistently better clinical outcomes:

- In-hospital mortality 6.8 % vs 7.7 % (aOR 0.87, 0.83–0.92; P < 0.001)
- Sepsis 12.5 % vs 13.6 % (aOR 0.90, 0.86–0.93, P<0.001)
- TLS 3.0 % vs 4.2 % (aOR 0.71, 0.66–0.76, P<0.001)

No sex-based differences emerged for major bleeding, mechanical ventilation or venous thromboembolism. Resource utilisation was broadly comparable: mean LOS differed by only 0.2 days (11.1 vs 10.9 d), although female sex modestly increased the likelihood of a prolonged stay (aOR 1.17, 1.05–1.30, P<0.005). Finally, the total charges incurred by females was found to be lower (β -$7558, P<0.001).

**Predictors of Mortality in TLS Hospitalizations**

| Outcome | Women vs Men (Crude) | Adjusted OR / β (95% CI) | P-value |
|---|---|---|---|
| **In-hospital Mortality** | 6.8% vs 7.7% | 0.87 (0.83–0.92) | <0.001 |
| **Sepsis** | 12.5% vs 13.6% | 0.90 (0.86–0.93) | <0.001 |
| **TLS** | 3.0% vs 4.2% | 0.71 (0.66–0.76) | <0.001 |
| **Major Bleeding** | No difference | - | - |
| **Mechanical Ventilation** | No difference | - | - |
| **Venous Thromboembolism** | No difference | - | - |
| **Length of Stay (Mean)** | 11.1 vs 10.9 days | aOR 1.17 (1.05–1.30) | <0.005 |
| **Total Charges** | Lower in females | β –$7,558 | <0.001 |

## Discussion

The study revealed critical racial disparities and predictors of worse mortality outcomes in TLS hospitalizations, like alcohol use, HIV status, and in-hospital complications.

In contrast, some predictors such as smoking, obesity, and female sex were associated with improved mortality outcomes. Future research should validate these findings and explore interventions targeting these significant predictors.

## References

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