

Acute Respiratory Failure and Invasive Mechanical Ventilation in Adult Acute Leukemia Admissions: National Trends and COVID-Era Outcomes, 2016–2022

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Background

- Acute respiratory failure and invasive mechanical ventilation (ARF/IMV) are high-risk complications in acute leukemia (AL).
- Contemporary national estimates of ARF/IMV incidence, COVID-era changes, and resource use are limited.

Objective

To evaluate national trends and inpatient outcomes associated with ARF/IMV among adults hospitalized with acute leukemia.

Methods

- Design: retrospective cohort study of the HCUP National Inpatient Sample, 2016–2022; adult admissions with any-listed AL diagnosis.
- AL categorized as AML/APL/myeloid-lineage versus non-AML AL.
- ARF/ARDS, intubation, IMV, tracheostomy, ECMO, and renal replacement therapy identified by ICD-10-CM/PCS codes.
- Survey weights, strata, and hospital clusters generated national estimates; resource use assessed with total charges.
- Multivariable survey models adjusted for demographics, payer, ZIP-code income quartile, hospital characteristics, AL subtype, COVID era, and concurrent complications (sepsis, shock, AKI, DIC, TLS, neutropenic fever).
- Outcomes: ARF/IMV incidence, mortality, survivor non-home discharge, length of stay, charges, and advanced organ support.

Limitations

- Administrative coding cannot confirm severity, laboratory values, or treatment intent.
- The NIS counts admissions, not unique patients; no outpatient or post-discharge follow-up.
- Charges reflect billed amounts rather than delivered costs of care.

Findings

677,905

Weighted AL admissions (≈ 96,844 per year)

13.8%

Admissions with ARF/IMV (IMV alone, 4.8%)

11.0 → 16.3%

ARF/IMV, 2016 to 2022 (aOR 1.08 per year)

9.08

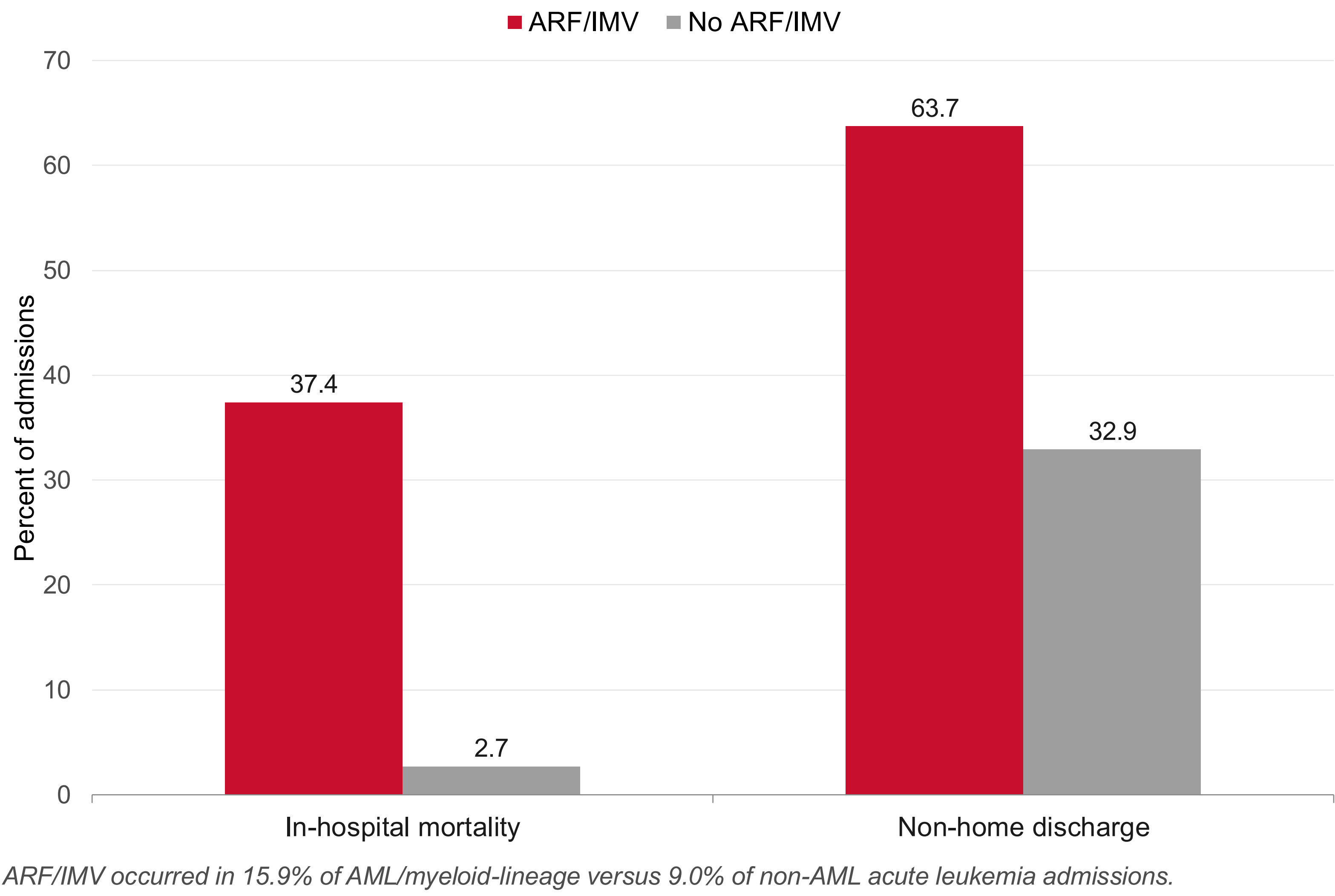
Adjusted odds of in-hospital mortality with ARF/IMV

Outcomes

Outcome	ARF/IMV	No ARF/IMV
In-hospital mortality	37.4%	2.7%
Non-home discharge*	63.7%	32.9%
Length of stay, days	16.9	10.4
Total charges	\$297,302	\$140,708
Advanced organ support	8.8%	—

**Among survivors. Advanced organ support 1.9% of the overall cohort.*

Figure



ARF/IMV occurred in 15.9% of AML/myeloid-lineage versus 9.0% of non-AML acute leukemia admissions.

Adjusted

Model	Estimate (95% CI)
ARF/IMV per year	OR 1.08 (1.07–1.09)
COVID era	OR 1.32 (1.27–1.37)
COVID era, U07.1 excluded	OR 1.21 (1.16–1.26)
Mortality with ARF/IMV	OR 9.08 (8.54–9.65)
Non-home discharge	OR 3.29
Length of stay	+6.85 days
Total charges	+\$168,217

All $P < .001$.

Conclusions

ARF/IMV affected one in seven adult acute leukemia admissions, increased during the COVID era independent of coded COVID-19, and was associated with markedly higher mortality, discharge burden, length of stay, and charges.