Therapeutic Era-Driven Survival Trends in Acute Myeloid Leukemia: A SEER-Based Analysis of Age-Stratified Gains and Persistent Disparities (2000–2022)

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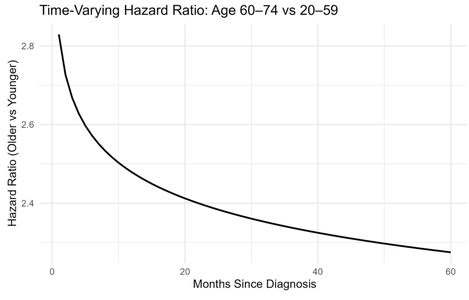
BACKGROUND

Acute myeloid leukemia (AML) treatment has undergone major transitions in the past two decades, evolving from traditional chemotherapy (2000–2005), to widespread use of reduced-intensity conditioning (RIC) transplants (2006–2013), and more recently, to targeted therapies (2014–2022). However, the extent to which these innovations have translated into survival gains across age and sociodemographic groups remains insufficiently characterized.

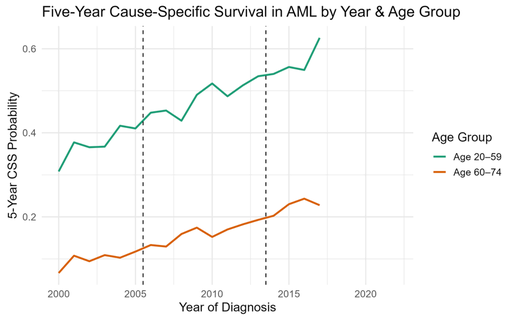
METHODOLOGY

Using SEER 17 registry data from 2000 to 2022, we identified 32,510 adults aged 20–74 diagnosed with first primary AML. Patients were stratified into three treatment eras: pre-RIC, RIC diffusion, and targeted therapy. Five-year AML-specific and overall survival were estimated via Kaplan–Meier and Fine–Gray models. Temporal survival trends and subgroup disparities were assessed using multivariable Cox regression incorporating age-by-era interaction terms, time-dependent covariates, and competing-risks analyses. Socioeconomic status (SES) was defined by county-level median income and grouped into tertiles.

Time Varying Hazard Ratio



Five-Year Cause Specific Survival in AML



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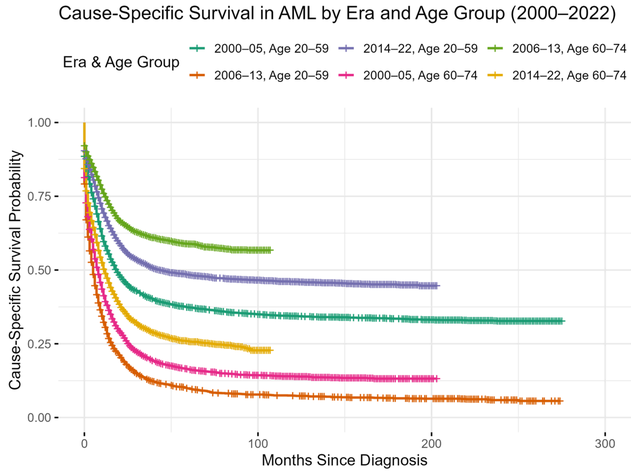
FINANCIAL DISCLOSURE

This author declares no competing financial interests.

RESULTS

AML-specific survival improved across all eras, with notably larger gains in younger adults (20–59 years), whose 5-year survival increased from 37.3% to 58.9%. In contrast, older adults (60–74 years) improved from 9.9% to 25.8%. Overall survival mirrored these trends, rising from 34.2% to 53.0% in younger patients and from 7.9% to 20.3% in older patients. Cox models confirmed significantly higher AML-specific mortality in older adults (HR 2.26, $p<0.001$), and interaction analyses revealed attenuated benefits in the targeted therapy era for this group (interaction HR 1.11, $p = 0.003$). Competing-risks models showed declining AML mortality over time (sHR 0.58 for 2014–2022 vs. 2000–2005), but persistent disparities: males (sHR 1.11), patients in the lowest SES tertile (sHR 0.89 for highest vs. lowest), and those in nonmetropolitan counties experienced significantly worse outcomes. Time-dependent Cox models further showed that older adults faced a 2.83-fold higher hazard at diagnosis, which declined modestly but remained elevated through five years.

Cause-Specific Survival in AML by Era and Age-group



CONCLUSION

Therapeutic advances have led to meaningful survival improvements in AML, especially among younger adults. Nonetheless, older age, male sex, rural residence, and socioeconomic disadvantage remain key barriers to equitable survival gains.

KEYWORDS

Stage at Diagnosis, Survival Trends, Socioeconomic Disparities, SEER Registry