

Geographic and Socioeconomic Stratification of Novel Therapy Survival Benefit in Elderly Acute Myeloid Leukemia: A Population-Based Analysis of the SEER Registry, 2010–2022



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BACKGROUND

- Acute myeloid leukemia (AML) in elderly patients carries a dismal prognosis.
- Landmark venetoclax-based regimens and targeted agents were approved between 2017 and 2022.
- It remains unproven whether these advances translate to measurable population-level survival gains.
- It is unknown if potential survival gains are equitably distributed across racial, socioeconomic, and geographic strata.

METHODS

- Study Population: Identified 10,786 adults aged ≥65 years with a first primary AML diagnosis from the SEER database (2010–2022).
- Patient Stratification: Stratified by therapeutic era (pre-novel: 2010–2016 vs. novel: 2017–2022), age band, race/ethnicity, chemotherapy receipt, county-level income tertile, and rural–urban classification.
- Survival Analysis: Estimated Overall Survival (OS) using Kaplan–Meier analysis with log-rank testing.
- Multivariable Modeling: Evaluated era-by-subgroup interaction terms using multivariable Cox regression.
- Competing Risk Analysis: Estimated AML-specific and non-AML mortality via Fine–Gray competing risk models.
- Temporal Trends: Identified inflection points in annual survival estimates using Joinpoint regression.

RESULTS

- Treatment Uptake:** Chemotherapy receipt increased from 54.8% to 64.1% between eras ($p<0.001$).
- Overall Survival Gains:**
 - Median OS improved from 2 to 3 months ($p<0.0001$).
 - 1-year OS rose from 20.7% to 27.7% (+7.0 percentage points [pp]).
 - 5-year OS increased from 4.7% to 7.6%.
- Age-Based Disparities:**
 - Significant 1-year OS gains in ages 65–74 (+8.2 pp, $p<0.001$) and 75–84 (+6.2 pp, $p<0.001$).
 - No significant gain for ages ≥85 (+2.9 pp, $p=0.058$); era×age interaction confirmed benefit attenuation with advancing age (HR 1.19 for ≥85, $p=0.002$).
- Racial Disparities:** Non-Hispanic Black and Hispanic patients showed no statistically significant improvement ($p=0.623$ and $p=0.051$, respectively), with an unfavorable era×race trend for Non-Hispanic Black patients (interaction HR 1.15, $p=0.077$).
- Socioeconomic Disparities:** Low-income counties had the smallest chemotherapy uptake increase (+6.5 pp vs. +10.1 pp) and smallest 1-year OS gain (+4.7 pp vs. +7.2 pp).
- Mortality & Multivariable Analysis:**
 - 12-month AML-specific mortality declined from 71.3% to 62.9% (-8.4 pp).
 - Novel era independently reduced overall mortality risk (HR 0.951, 95% CI 0.912–0.991, $p=0.016$).

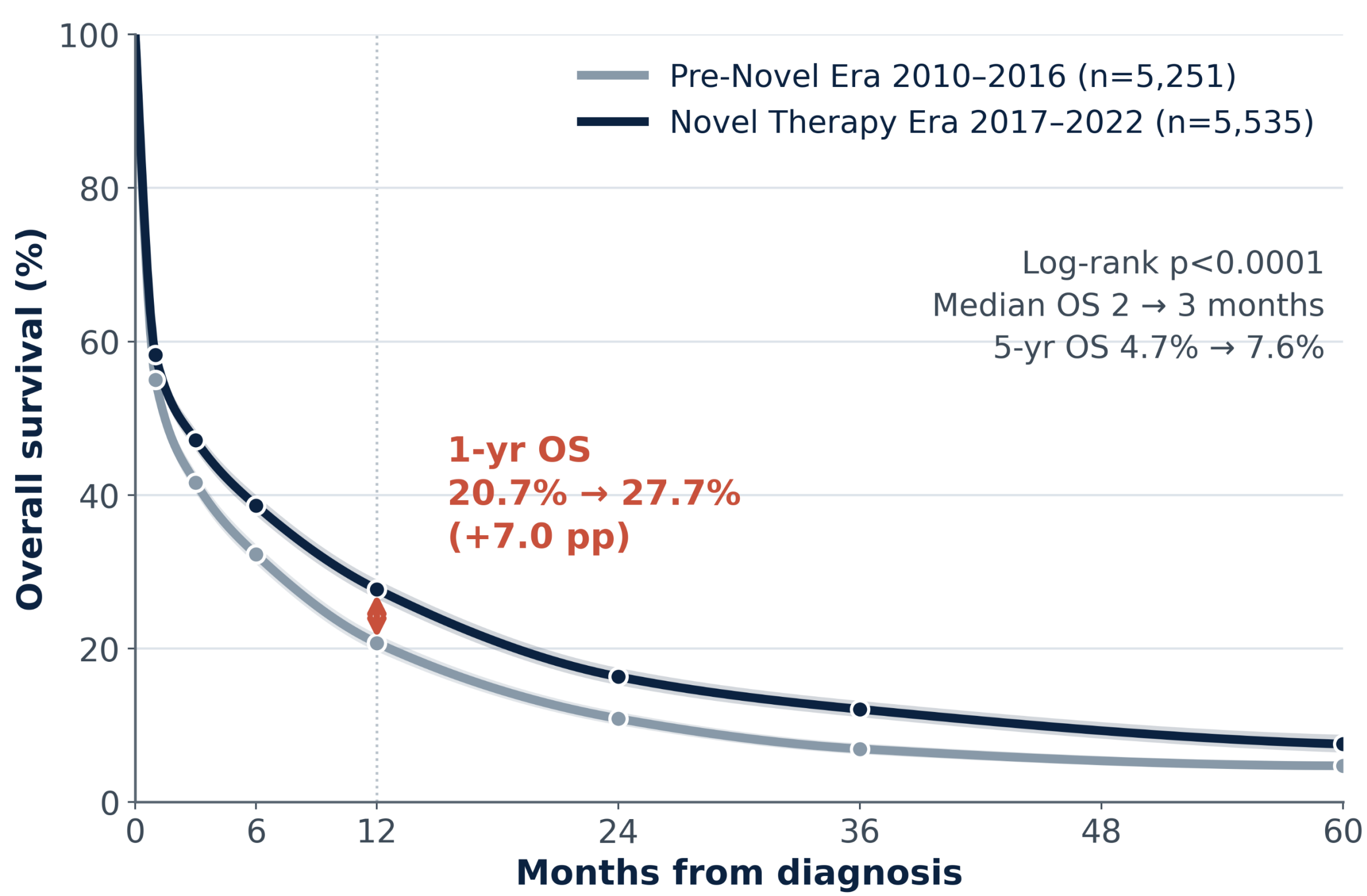


Figure 1: Overall Survival by Era

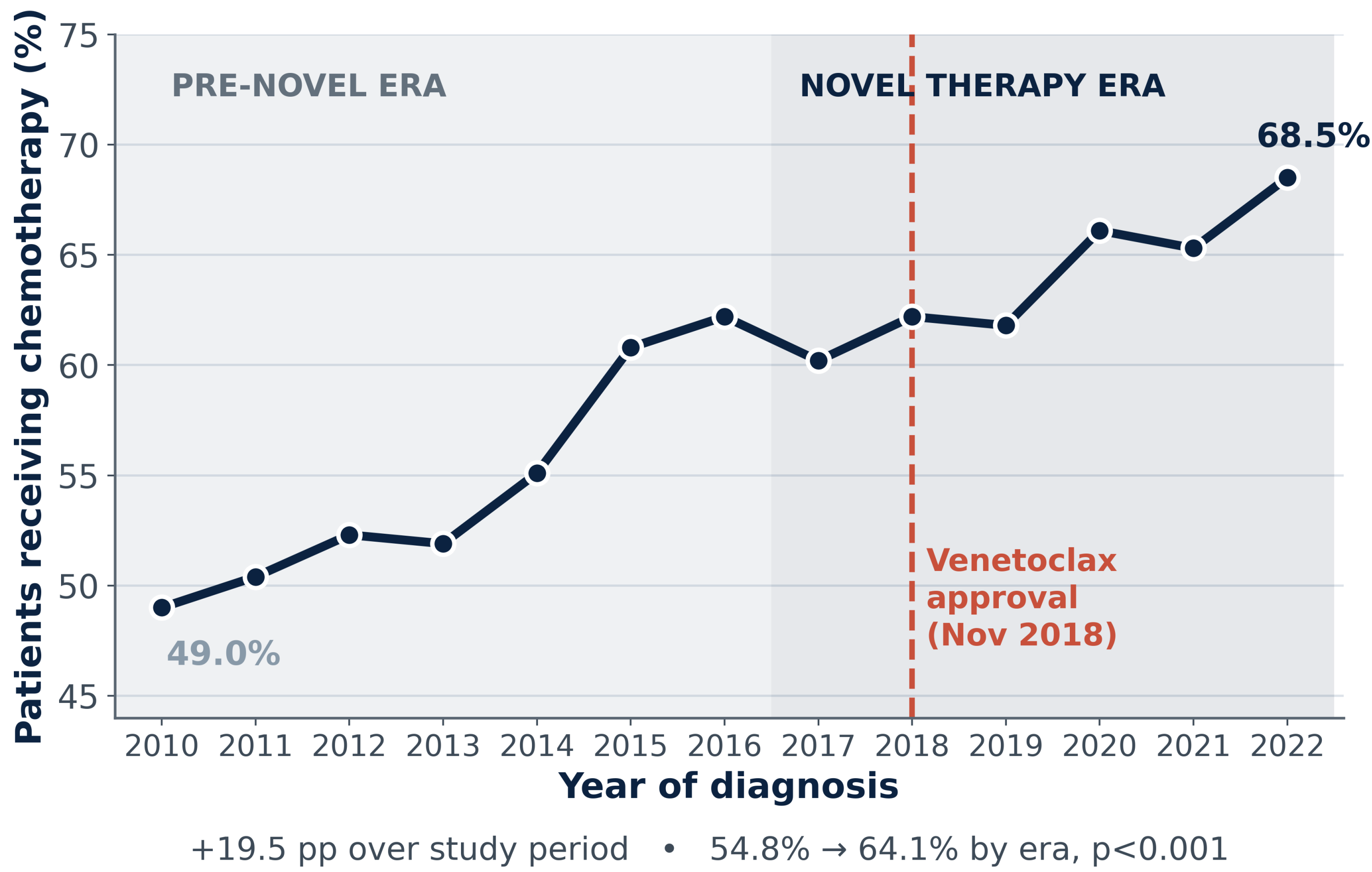


Figure 2: Chemotherapy receipt by year

DISCUSSION

- The novel therapy era yielded a measurable but modest survival benefit in elderly AML.
- Survival gains were temporally concordant with a 19.5 percentage point (pp) rise in chemotherapy receipt, pointing to treatment intensification as the key driver.
- Survival gains were absent or attenuated among:
 - Patients aged ≥85
 - Non-Hispanic Black patients
 - Hispanic patients
 - Patients residing in low-income counties
- Highlights significant age-based, racial, and socioeconomic differentials in access to modern AML therapies.
- Targeted interventions are urgently required to improve novel therapy uptake in underserved populations.

