

Non-Small Cell Lung Cancer (NSCLC) Biomarker Testing and Survival Outcomes: Real-World Analysis of Timing, Disparities, and Provider Behavior

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Background

- Precision medicine in oncology aims to tailor treatments to patient-specific tumor characteristics.
- Biomarker testing in non-small cell lung cancer (NSCLC) plays a pivotal role in identifying candidates for targeted therapies.
- Despite advances in precision oncology, many NSCLC patients still **do not receive** timely biomarker testing or optimal treatment in real-world practice.
- This study evaluates real-world implications of timing of biomarker testing for NSCLC on treatment outcomes.

Objectives

Assesses the impact of biomarker testing timing, treatment combinations, social determinants of health, and provider testing behavior on survival and mortality outcomes in NSCLC using real-world data.

Methods

In this retrospective cohort study, we used de-identified patient-level claims data from the **PurpleLab® Comprehensive Repository for Exploration Analysis & Research (CLEAR Claims)** (n ≈ 150,000 NSCLC patients) from January, 2020 to July, 2024.

Key Variables:

- Biomarker testing timing:** Pre- vs. post-initiation of therapy
- Treatment sequences:** Combinations of chemotherapy and targeted therapy:
 - C = Chemotherapy
 - B = Biomarker
 - T = Targeted
 - NT = No Treatment
- Provider quintiles:** Stratified by proportion of patients receiving biomarker testing

Statistical Analysis:

- Survival outcomes:** Cox proportional hazards models (adjusted for age, comorbidities, risk scores)
- Group comparisons:** Kaplan-Meier curves, Kruskal-Wallis tests, Dunn's post hoc comparisons
- Adjustment for risk:** Deyo-Quan adaptation of the Charlson Comorbidity Index (CCI)
- Provider-level effects:** Comparison of mortality rates across testing frequency quintiles

Results

- Patients receiving biomarker testing followed by chemo and targeted therapy had the **highest median survival** (592 days) (**Table 1**).
- Early biomarker testing (pre-initiation of therapy) was associated with an **8% lower hazard of death** (**Figure 1**).
- Socioeconomic disparities affected survival (**Figure 1**):
 - Married patients** had lower risk (HR=0.87) compared to single patients.
 - African American** patients had higher risk (HR=1.06) compared to White patients.
- The group that received **biomarker testing and no treatment (B+NT)** demonstrated the lowest survival probability across the study period followed closely by **no treatment (NT)** (**Figure 2**).
- Providers in the **top testing quintile** showed **lower patient mortality** (~57.3%) compared to the lowest quintile (~62.5%) (**Figure 3**).

Conclusion

- Timely biomarker testing significantly **improves NSCLC outcomes and reduces mortality**.
- Disparities in survival by SDOH indicators** suggest that further investigation is needed to understand and address underlying causes of delayed biomarker testing.
- Providers with consistent testing behavior** may help mitigate mortality risks.

Table 1: Median Survival Days by Testing and Treatment Combination

Strata	Patient Count	%	Median Survival Days
B+C+T	35906	27.5%	592
T	3497	2.7%	566
B+C	9614	7.4%	493
B+T	10814	8.3%	489
C+T	11660	8.9%	414
C	5585	4.3%	362
NT	31591	24.2%	134
B+NT	21727	16.7%	132

Figure 1: Cox Proportional Hazard Model

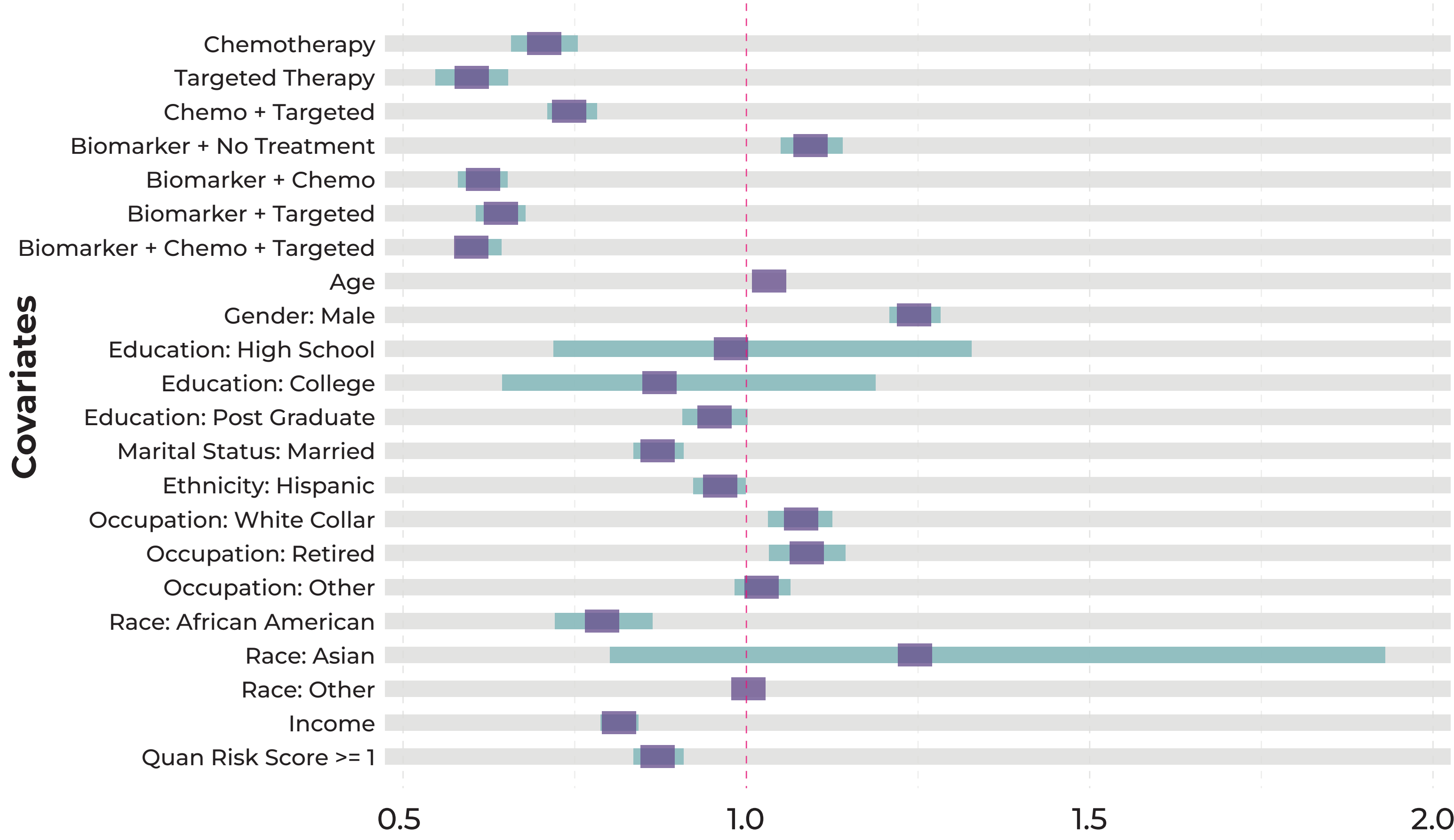


Figure 2: Kaplan-Meier Survival Curves Across Treatment Combinations

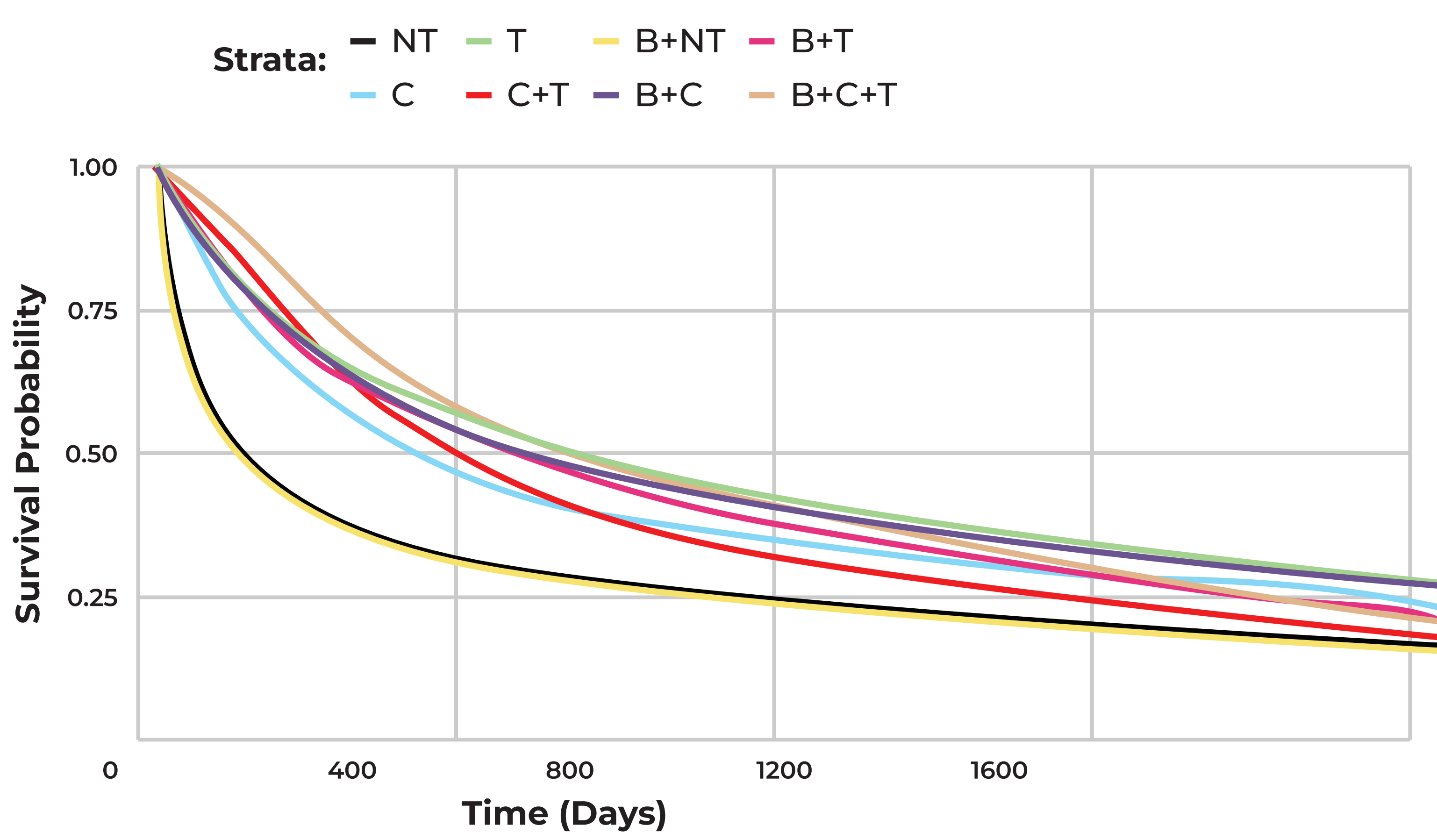


Figure 3: Trend of Biomarker Testing and Death Across Provider Quintiles

