

# The Role of Immortal Time Bias in Assessing the Relationship between Treatment Intensity and Survival in Hodgkin Lymphoma: An Analysis of Surveillance, Epidemiology and End Results (SEER)-Medicare Data

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## Background/Methods:

- Hodgkin lymphoma (HL) is highly curable with multi-agent chemotherapy in younger patients
- Worse survival in older patients may reflect less aggressive treatment with toxic chemotherapy
- Patients may die before initiation or completion treatment, which can introduce immortal time bias

## Objectives:

- Assess relationship between treatment intensity and 3-year overall survival (OS) in older patients with HL
- Compare results from models that ignore immortal time bias (naive analysis) and account for immortal time bias (landmark analysis)

## Methods:

- Patients diagnosed with advanced stage HL at age  $\geq 65$  years in 1999-2014 SEER-Medicare data
- Treatment classified as (1) full chemotherapy regimen, (2) partial chemotherapy regimen, (3) single chemotherapy agent or radiotherapy (RT), or (4) no documented treatment
- Kaplan-Meier plots estimated OS by treatment
- Cox models adjusted for demographics, disease characteristics, and geographic factors
- Naïve model: time 0 is time of diagnosis
- Landmark model: patients required to survive at least to 4 months; this was set as time 0

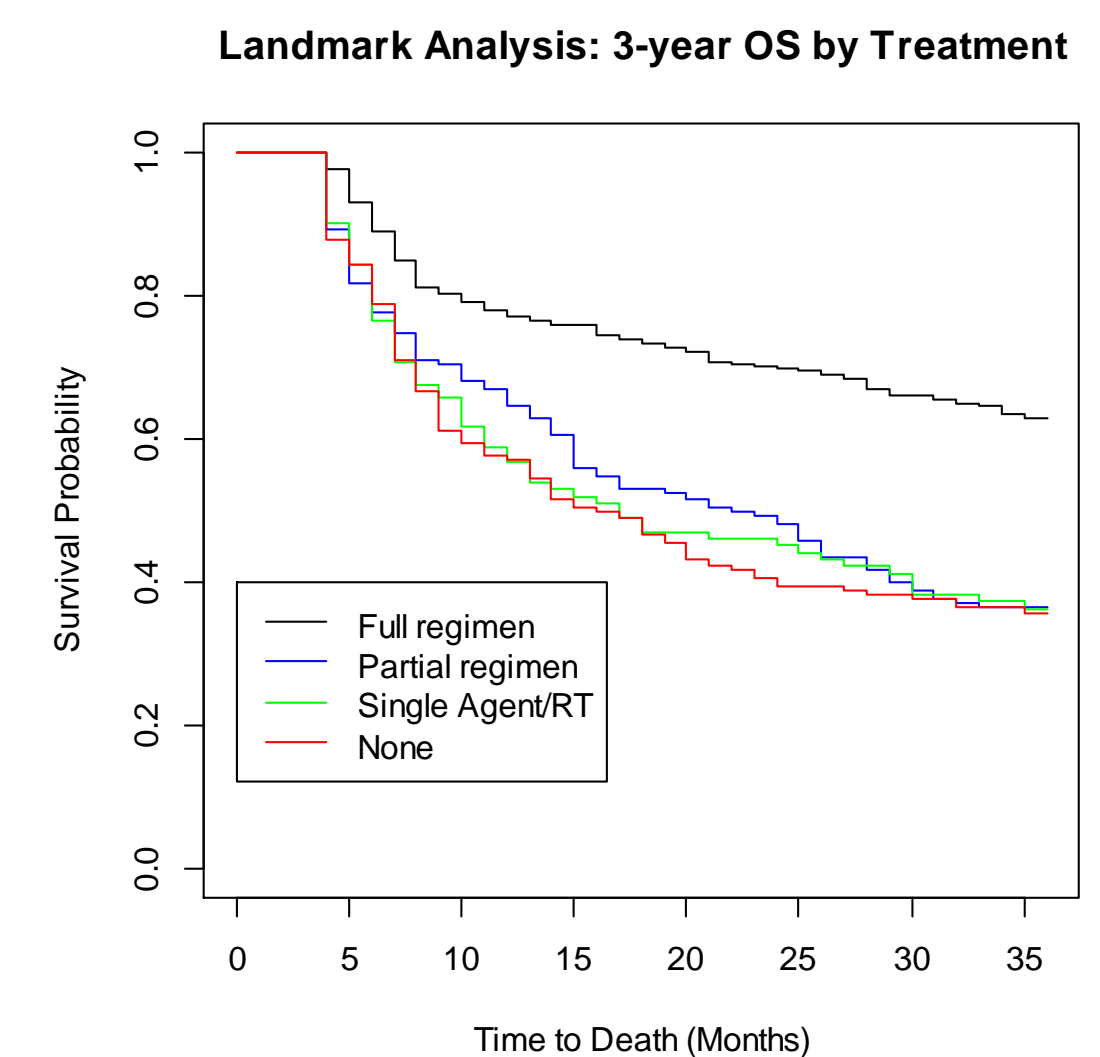
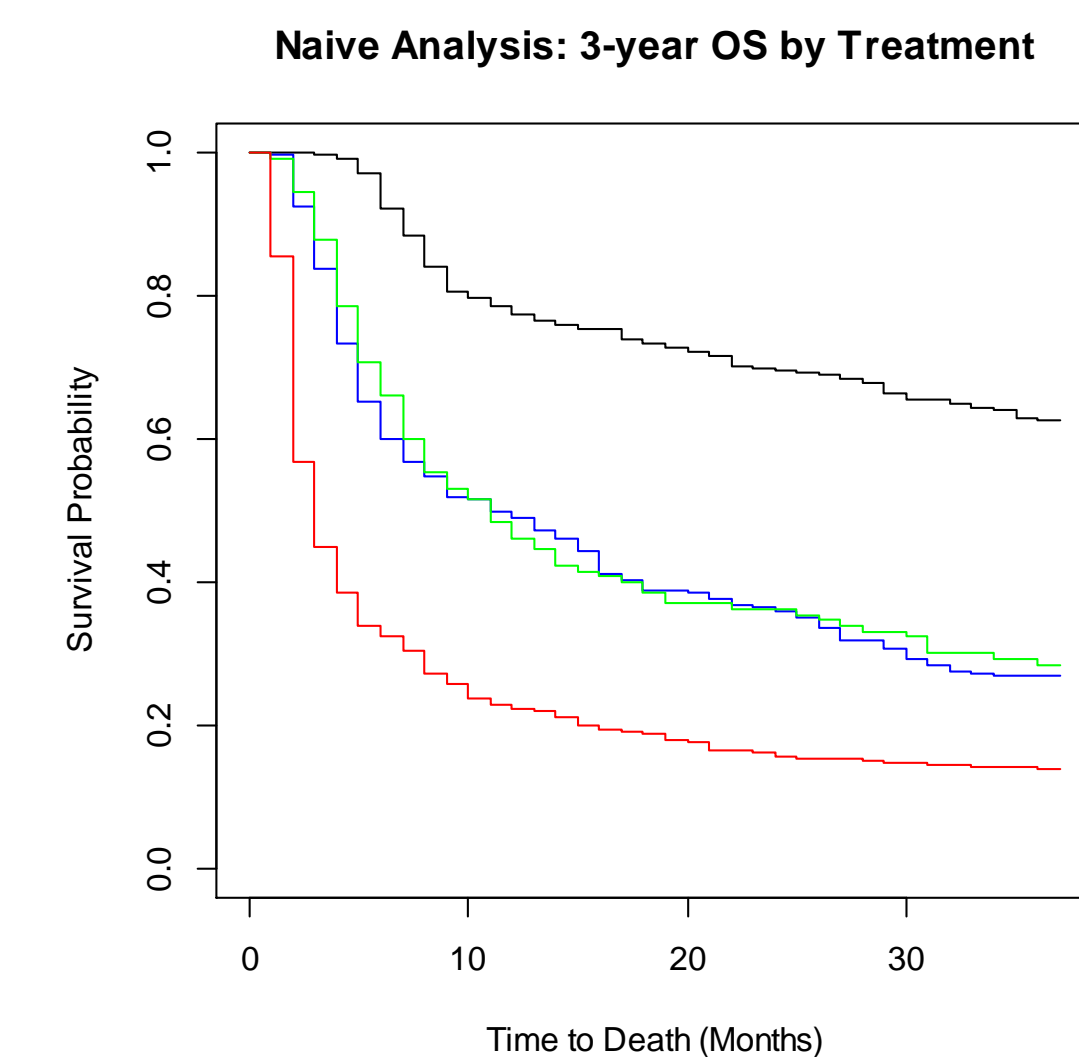
Landmark analysis can account for *immortal time bias* when studying treatment intensity and survival in SEER-Medicare

Patients treated with full chemotherapy regimens, who are likely more healthy, had the highest overall survival

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## Results:

- 1492 patients were included in Naïve analysis and 1131 were include in Landmark analysis



## Adjusted HR for 3-year OS for Treatment

	Naïve Analysis, HR (95% CI)	Landmark Analysis, HR (95% CI)
Full regimen	reference	reference
Partial regimen	2.47 (2.03, 3.01)	1.81 (1.43, 2.29)
Single agent/RT	2.19 (1.71, 2.82)	1.74 (1.30, 2.34)
None	4.89 (4.12, 5.81)	1.98 (1.56, 2.52)

## Future Directions for Research:

- Consider methods to adjust for confounding (e.g., propensity score weighting, instrumental variable analysis)
- Confirm findings in other data sources