Impact of increasing wait times on overall mortality of Chimeric Antigen Receptor T-cell therapy in large B-cell lymphoma: A discrete event simulation model

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Abstract

The development of CAR T-cells has transformed oncology treatment, offering the potential to cure certain cancers. While shown to be effective in selected populations, the substantial usage of health care resources may potentially delay patient access to this treatment in the future. Our objective was to estimate the potential impact of CAR T-cell therapy efficacy with increasing wait-times, when compared to standard chemotherapy for relapsed/refractory DLBCL patients.

A health system-level discrete-event-simulation model was developed to project the potential impact on wait-times of CAR T-cell therapy for relapsed/refractory DLBCL patients. Waiting queues and health-states related to treatment and clinical progression were implemented. Using data from literature, we evaluated 9 scenarios with CAR T-cell therapy, with wait-times ranging from 1 to 9 months. The outcome of interest was one-year all-cause mortality.

For a 1 to 9 month wait-time, the model predicted one-year mortality to increase from 36.1%

We found that modest delays in CAR T-cell therapy significantly hinder its efficacy. Since CAR T-cell therapy is offering a potential cure, its expected that the demand will be high once introduced. Wait-time may be prolonged if system resource availability does not match demand. Strategies must be developed to minimize the impact of delays and reduce complications during waiting.