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An Economic Model to Estimate Costs of Cytokine Release Syndrome and Neurological Events Among Patients Treated with CAR T Cell Therapies for Relapsed or Refractory Follicular Lymphoma

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Background: CAR T cell therapies have exhibited promising clinical responses in populations that are traditionally challenging to treat. Axicabtagene ciloleucel (axi-cel) and tisagenlecleucel (tisa-cel) are 2 CAR T cell therapies now available in the United States (US) for the treatment of R/R follicular lymphoma (FL) after 2 or more lines of systemic therapy. Lisocabtagene maraleucel (liso-cel) is currently being investigated in clinical trials for the treatment of patients with R/R second-line high-risk and third line or later FL. As observed in other approved indications, the improved response and survival rates from the introduction of CAR T cell therapies are typically accompanied by the potential for AEs, such as cytokine release syndrome (CRS) and neurological events (NEs). However, the rates and severity of these AEs tend to vary across CAR T cell therapies. Understanding the economic implications of these 3 CAR T cell therapies and their associated AEs is crucial for informed decision-making and to underscore key economic and safety differences across the 3 CAR T cell therapies. The primary objective of this analysis was to estimate the average per-patient weighted costs of CRS and NEs for a patient with R/R FL treated with a CAR T cell therapy (liso-cel, axi-cel, or tisa-cel) based on clinical trial rates. Secondary objectives included estimates for (1) the opportunity cost of treating with axi-cel or tisa-cel versus liso-cel and (2) the additional number of patients eligible for treatment with liso-cel based on a hypothetical sample of 100 treated patients.

Methods: An economic model was developed using data from the TRANSCEND FL (NCT04245839; n = 130), ZUMA-5 (NCT03105336; n = 124), and ELARA (NCT03568461; n = 97) studies. CRS and NE rates reported in the FL studies were incorporated in a decision analytic economic model to estimate costs from a health care system perspective in 2023 US dollars. Microcosting analysis data from the TRANSCEND FL study were used as CRS and NE cost inputs; the model assumed that CRS and NE management costs across CAR T cell therapies would not differ. The analysis used a Monte Carlo simulation approach to address uncertainty surrounding the clinical and economic data. The model output was a weighted average that represented cost for the average treated patient, including those with and without CRS and/or NEs. The average per-patient total cost difference between CAR T cell therapies was used to estimate the number of additional patients who could be treated with liso-cel versus axi-cel or tisa-cel.

Results: Rates of CRS grade 1–2/≥ 3 were 56.9/0.8% for liso-cel, 71.8%/6.5% for axi-cel, and 48.5%/0.0% for tisa-cel. Rates of NE grade 1–2/≥ 3 were 13.1%/2.3% for liso-cel, 41.1%/ 15.3% for axi-cel, and 34.0%/ 3.1% for tisa-cel. The overall per-patient weighted average costs for CRS and NEs were estimated to be $20,626 for liso-cel, $44,096 for axi-cel, and $26,460 for tisa-cel (Figure). The per-patient weighted average cost per CRS event was $14,631 for liso-cel, $21,299 for axi-cel, and $12,456 for tisa-cel. The per-patient weighted average cost per NE was $5994, $22,797, and $14,004 for liso-cel, axi-cel, and tisa-cel, respectively. Total per-patient cost differences for liso-cel compared with axi-cel and tisa-cel were −$23,470 and −$5835, respectively. The resulting opportunity costs from treating 100 patients with liso-cel instead of axi-cel and tisa-cel would allow for the treatment of an additional 5.2 and 1.3 patients, respectively.

Conclusions: This economic analysis revealed lower overall per-patient weighted average costs associated with liso-cel compared with axi-cel and tisa-cel, primarily due to lower CRS and NE rates versus axi-cel and lower NE rates versus tisa-cel. In comparison with axi-cel and tisa-cel, liso-cel demonstrated robust economic and clinical value, with lower rates of CRS and/or NEs associated with substantial cost savings per AE event.

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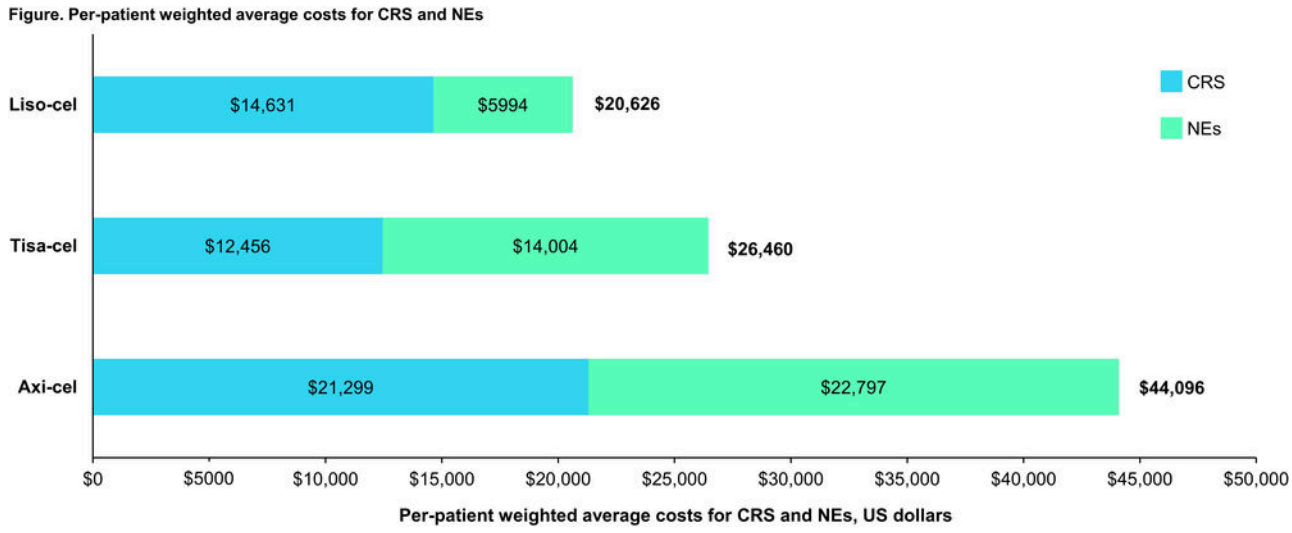

Figure 1

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