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Cost-Effectiveness and Outcomes of Utilizing Tisagenlecleucel Therapy (CAR T-cell) in Pediatric Acute Lymphoblastic Leukemia in Comparison to Standard of Care (SoC) Therapies: A Scoping Review

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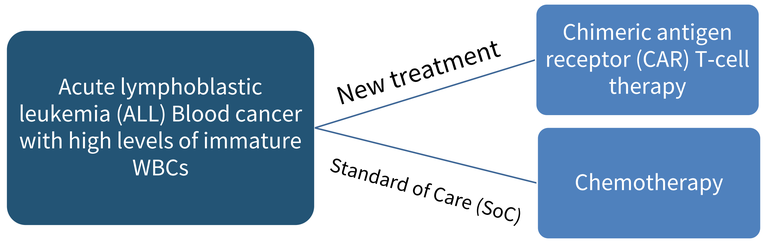
Background and Significance



- ALL cells exploit various mechanisms to avoid immune recognition and destruction by the immune system, making children especially vulnerable (Pastorczak, 2021)
- Ages 0-14: About 32% cases of cancer cases (N=14358) were leukemia, in which 79% was ALL (Ward et. al., 2014).
- Ages 0-19: About 26% cases of cancer cases (N=21355) were leukemia, in which 75% was ALL (Ward et. al., 2014).
- Children living in high socioeconomic deprivation have the worst health outcomes compared to other social determinants of health patterns (SDOH), including more mental health issues, suicidal behaviors, lower cognitive performance, & poor health (Yunyu et. al., 2023).
- Children from historically marginalized populations, including those living in poverty, are significantly more likely to both relapse and die from ALL, even when treated with highly standardized therapy on clinical trials (Newman et. al., 2023).
- **Project Significance:** To assess the correlations between outcomes and cost of treatment methods for pediatric ALL patients, especially concerning CAR T-cell therapy and chemotherapy and how cost create differences in treatment outcomes.
- **Greater Significance**: To start conversations about the larger disparities, present in the healthcare industry in relation to SDOH and how they impact the pediatric cancer population, and what can be done to combat these disparities.

Methods

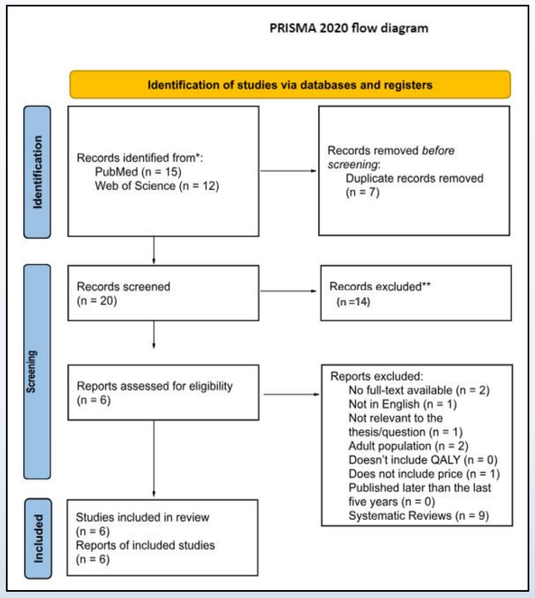


Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram of included papers

Results

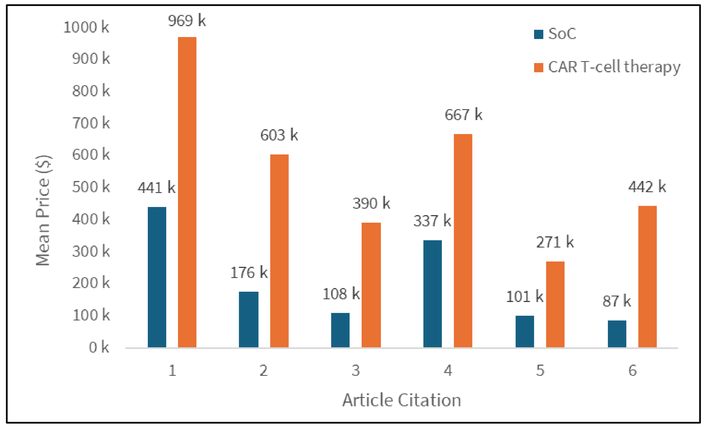


Figure 2. The mean price for SoC vs CAR T-cell therapy in USD

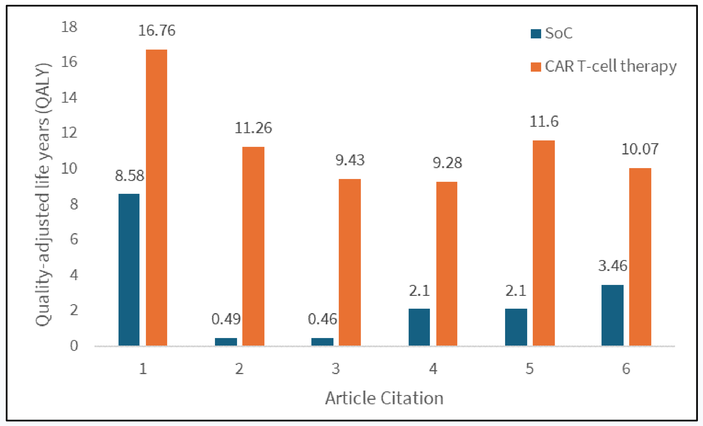


Figure 3. The quality-adjusted life years (QALY) gained for SoC vs CAR T-cell therapy

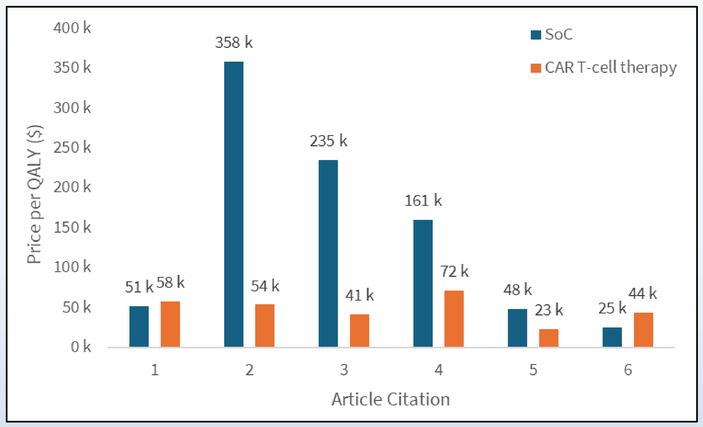


Figure 4. The price per QALY for SoC vs CAR T-cell therapy in USD

Results cont.

CAR T-cell therapy **provides 5.62 to 16.73 more QALY** compared to SoC. CAR T-cell therapy was found to be more expensive than SoC, but with a more favorable price per QALY.

Incremental cost-utility ratio was used to directly evaluate the value of each additional QALY gained from CAR T-cell therapy. This was **$17,941 to $64,572 for each additional QALY.**

Discussion

- ***CONCLUSION: CAR T-cell therapy was more expensive and provided more QALY than other SoCs.***
- Increased CAR T-cell therapy utilization may be a way to increase quality of life of pediatric ALL patients, as well as reduce economic burden on parents and the healthcare system.
- 1 in 5 children with cancer in the United States faces poverty (Newman et. al., 2023), so reducing barriers to CAR T-cell therapy access may have the potential to reduce health disparities among people of different SES background.
- Limitations included: Using only 2 databases. using “and" search strings, and converting currency to US dollars for studies conducted outside the United States because different healthcare/insurance systems exist abroad.

Future Directions

- Financial accessibility of CAR T-Cell treatment should be further assessed to ensure that this therapy can reach those from economically disadvantaged backgrounds, as well as other underrepresented backgrounds.
- Socioeconomic factors and insurance coverage must be a consideration when formulating a treatment plan. We can consider if ethnicity and racism plays a role in influencing which patients receive the option.
- Further research could be conducted to evaluate how socioeconomic status impacts QALY for CAR T-Cell therapy, and if there are any discrepancies in outcomes among different economic, racial, and geographic groups.

Acknowledgements and References

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