Chimeric Antigen Receptors T-cell (CAR-T) Utilization Patterns and Associated Outcomes

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Background

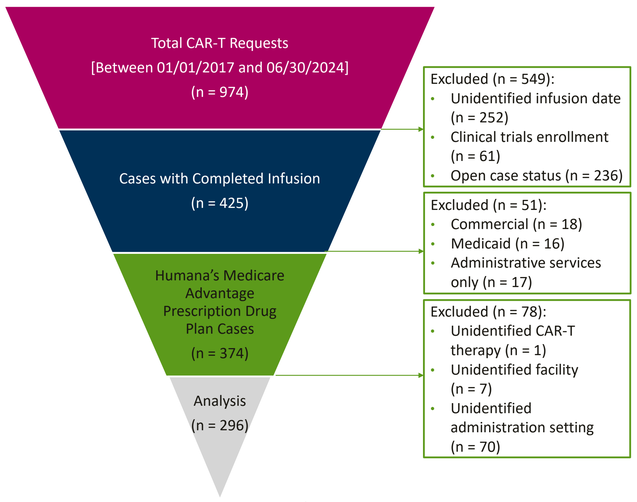
- Chimeric antigen receptors T-cell (CAR-T) therapy utilizes genetically modified T-cells to treat cancerous cells. CAR-T products are used to treat non-Hodgkin's lymphomas (NHL), multiple myeloma (MM) and acute lymphoblastic leukemia (ALL). Four CAR-T products (Kymriah, Yescarta, Breyanzi, Tecartus) are approved for NHL, two CAR-T products (Abecma, Carvykti) are approved for MM, and two CAR-T products (Kymriah, Tecartus) are approved for ALL.[1]
- Due to safety concerns such as cytokine release syndrome (CRS) and immune effector cell-associated neurotoxicity syndrome (ICANS), CAR-T therapies are administered at centers with hematopoietic stem cell transplant experience. The American Society of Transplantation and Cellular Therapy and the National Comprehensive Cancer Network, offer guidance on patient management; however, centers differ in their management strategies.[2]
- CAR-T therapy coverage is challenging due to its high costs, which can reach up to $1 million based upon real-world data.[3] Medicare currently covers CAR-T therapy in both inpatient and outpatient settings. However, shifting to outpatient administration may draw more evaluation of Medicare's outpatient drug payment methodology, particularly concerning the 6% add-on payment.[4]
- As CAR-T therapies become more prevalent, it is important to understand the differences between outpatient and inpatient administration, with a focus on therapy management and clinical outcomes to optimize the overall value of the treatment. Evolving dynamics for these types of technologies and treatments presents significant opportunities for how to leverage data to discern outcome benefits.

Objectives

- To examine and summarize the utilization patterns of CAR-T products, patient demographics, and associated clinical outcomes.

Methods

- Retrospective claims data were collected during January 1, 2017 to June 30, 2024 from all CAR-T therapy requests.
- Applied inclusion and exclusion criteria.
- Performed descriptive statistics on final data set (n=296).



Results

Figure 1. FDA-Approved CAR-T Products and Approval Timelines

Updated approval timeline as of 07/2024

2017
- 08/2017 **Kymriah**, r/r 3L Pediatric ALL approved
- 10/2017 **Yescarta**, r/r 3L DLBCL-NHL approved

2018
- 05/2018 **Kymriah**, r/r 3L DLBCL-NHL approved

2019

2020
- 07/2020 **Tecartus**, r/r MCL approved

2021
- 02/2021 **Breyanzi**, r/r 3L DLBCL-NHL approved
- 03/2021 **Yescarta**, r/r 3L FL approved
- 03/2021 **Abecma**, r/r 5L MM approved
- 10/2021 **Tecartus**, r/r Adult ALL approved

2022
- 02/2022 **Carvykti**, r/r 5L MM approved
- 04/2022 **Yescarta**, r/r 2L DLBCL-NHL approved
- 05/2022 **Kymriah**, r/r 3L FL approved
- 06/2022 **Breyanzi** r/r 2L DLBCL-NHL approved

2023

2024
- 03/2024 **Breyanzi**, r/r 3L CLL/SLL-NHL approved
- 04/2024 **Abecma**, r/r 3L+ MM approved
- 04/2024 **Carvykti**, r/r 2L+ MM approved
- 05/2024 **Breyanzi**, r/r 3L FL approved
- 05/2024 **Breyanzi**, r/r MCL-NHL approved

ALL = Acute Lymphoblastic Leukemia
CLL/SLL = Chronic Lymphocytic Leukemia/Small Cell Lymphocytic Lymphoma
DLBCL = Diffused Large B-Cell Lymphoma
FL = Follicular Lymphoma
NHL = Non-Hodgkin Lymphoma
MCL = Mantle Cell Lymphoma
MM = Multiple Myeloma
r/r = relapsing or refractory

Figure 2. Trends in CAR-T Therapy Administration

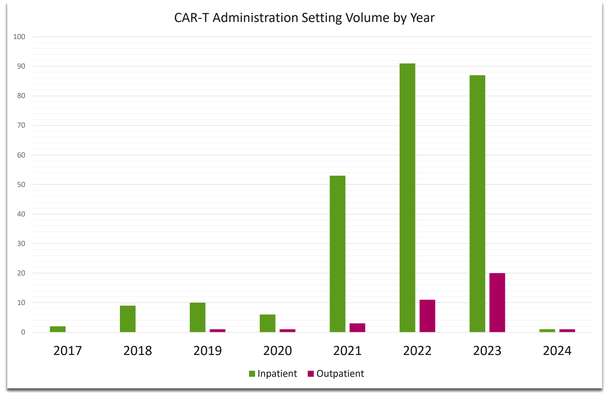


Figure 3. Patient Distribution Geographical Heatmap

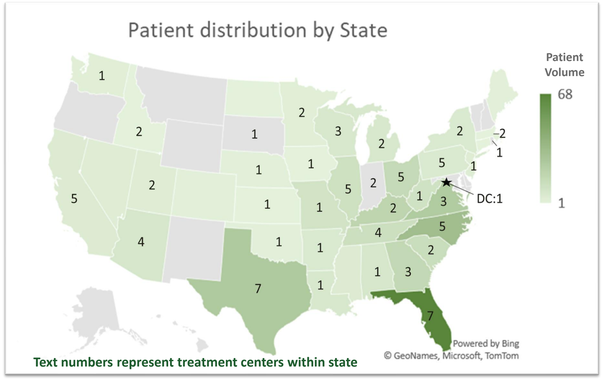
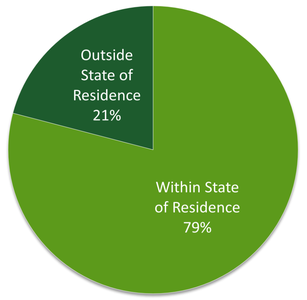


Table 1. Patient and Clinical Characteristics

Characteristics	Age < 65y (n = 60)	Age 65-75y (n = 148)	Age > 75y (n = 88)	All Patients (n = 296)
Age: mean in years (range)	56.8	69.6	78.4	69.6 (28-87)
Gender				
Male: n (%)	39 (65)	103 (69.6)	57 (64.8)	199 (67.2)
Female: n (%)	21 (35)	45 (30.4)	31 (35.2)	97 (32.8)
CAR-T administration setting				
Inpatient: n (%)	52 (86.7)	128 (86.5)	79 (89.8)	259 (87.5)
Length of Stay: mean in days (range)	14.4 (1-46)	15.3 (1-60)	13.7 (1-56)	14.6 (1-60)
Outpatient: n (%)	8 (13.3)	20 (13.5)	9 (10.2)	37 (12.5)
CAR-T infusion to deceased date				
≤ 6 months: n (%)	3 (5.0)	36 (24.3)	12 (13.6)	61 (20.4)
> 6 months: n (%)	12 (20.0)	27 (18.2)	13 (14.8)	52 (17.6)

Figure 4. Patient Travel for CAR-T Administration



Discussion

- Among 974 CAR-T cases recorded, the study included 296 CAR-T claims from Medicare beneficiaries who were predominantly administered in inpatient settings (87.5%). Despite the patient geographic spread, the treatment facility utilization distribution reveals that states like Florida, North Carolina, and Texas are pivotal, collectively administering 47.5% of inpatient and 56.8% of outpatient CAR-T therapies. This reflects Humana markets and access to therapies.
- Florida, North Carolina, and Texas also have significantly fewer members traveling out-of-state for CAR-T care versus the average (15% vs. 21%). In contrast, states with no recorded in-state use of CAR-T facilities by members exhibit a notable patient volume in neighboring states. Better understanding is needed to appreciate why members travel out of state for services. Factors such as proximity, referral services, and networking may be impacting how Humana members receive CAR-T care beyond the high-density areas.
- Another significant trend is the increasing outpatient administration of CAR-T therapies, particularly for MM and aggressive B-cell lymphoma. These trends reflect a growing confidence in the safety and feasibility of outpatient CAR-T administration, driven by advancements in clinical management and supportive care protocols, particularly in remote patient monitoring (RPM).
- The 20.4% mortality rate within six months is consistent with published data for the Medicare population.[5] Also, the length of stay does not vary significantly for those over 75 compared with younger patients, suggesting effective management of age-related complications with CAR-T therapy. A notable portion of Humana members over the age of 75 have received CAR-T therapy, despite limited data for this age group in pivotal clinical trials. Increased CAR-T utilization is expected in patients in this age group.
- **Limitations:** Retrospective claims data, primarily for billing, can be incomplete and/or contain coding errors. Furthermore, the data lacks detailed information on the reasons for inpatient versus outpatient use, whether related to CAR-T therapy toxicity management or other non-cancer-related visits. In addition, Medicare claims data is limited by the focus on older populations with comorbidities, reducing generalizability to younger patients. Also, there are gaps in data as a claim goes through several steps between being incurred and paid. Therefore, 2024 data is not comprehensive based on the study period. Lastly, the study is not statistically powered due to varying sample size across different therapies.
- **Potential Opportunities:**
  - Develop centers of excellence and best practices that can be adopted across both inpatient and outpatient administration settings to enhance patient outcomes and resource utilization.
  - Incorporate post utilization data into a real-time analytics tool to forecast and prepare for proactive strategy planning.
  - Advocate policy changes and adjust reimbursement models to better reflect the costs and benefits of each administration setting.
  - Formalize additional quality metrics for surveillance of care delivery models (e.g., facility performance metrics, readmission rates in outpatient administration).
  - Encourage collaboration between national professional societies, quality accreditation organizations, outcome registries, and regulatory agencies is crucial in balancing access and optimizing outcomes.
  - While optimal sequencing of other therapies targeting the same antigens (e.g., BCMA, CD19) as CAR-T products is unclear, evaluation of real-world evidence of agents in line of therapy is a next step.

Acknowledgments:

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