Healthcare Resource Utilization and Costs Among Patients With Relapsed/Refractory Multiple Myeloma Treated With Chimeric Antigen Receptor-T (CAR-T) Cell Therapy

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INTRODUCTION

- Chimeric antigen receptor-T (CAR-T) cell therapies have advanced the treatment of multiple myeloma (MM)
  - Ciltacabtagene autoleucel (cilta-cel) and idecabtagene vicleucel (ide-cel) are two approved CAR-T therapies for patients with relapsed/refractory MM (RRMM)
  - In the CARTITUDE-1 trial for cilta-cel, the overall response rate (ORR) was 97.9% (95% confidence interval [CI], 92.7%-99.7% at 27.7-month follow-up). At a median follow-up of 33.4 months, median overall survival (OS) was not reached, and median progression-free survival (PFS) was 34.9 months (95% CI, 25.2 months-not estimable)[1,2]
  - In the KarMMa trial for ide-cel, at a median follow-up of 24.8 months, the ORR was 73% (95% CI, not reported), median OS was 24.8 (95% CI, 19.9-31.2) months, and median PFS was 8.6 (95% CI, 5.6-11.6) months[3]
- However, healthcare resource utilization (HCRU) and costs are not well characterized for patients with RRMM who receive commercial CAR-T therapy

OBJECTIVE

- To describe real-world HCRU and costs with commercial CAR-T treatment in RRMM

METHODS

Study design

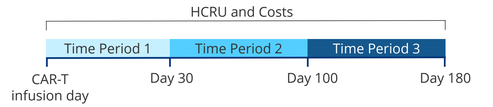
- This longitudinal, retrospective, observational study identified patients with RRMM treated with commercial CAR-T using the US national all-payer claims database, which covers approximately 80% of the nationally insured population

Patient eligibility

- Adults were eligible if they
  - Had ≥1 inpatient or outpatient claim with MM diagnosis in any position from January 1, 2014
  - Had ≥1 claim for commercial CAR-T (ide-cel or cilta-cel) from March 1, 2021, to September 30, 2022, on or after first observed MM diagnosis, with ≥12 months continuous enrollment before CAR-T infusion
  - Were not enrolled in a clinical trial during the study period

Outcomes

- All-cause HCRU and costs (in 2022 USD) were evaluated starting from the day of CAR-T infusion up to day 30 (including the CAR-T infusion day), from days 31-100 post-infusion, and days 101-180 post-infusion



MULTIPLE MYELOMA

RESULTS

Baseline characteristics

Of the 196 patients who received commercial CAR-T therapy, the mean age was 64.2 years, 58.2% were male, 130 (66.3%) received bridging therapy before CAR-T infusion, and 179 (91.3%) received inpatient CAR-T infusion (**Table 1**)

TABLE 1: Baseline characteristics during the 12-month period before index date

Sociodemographic characteristics	N=196[a]
Age, mean (SD)	64.2 (9.9)
Sex, n (%)	
Male	114 (58.2)
Region, n (%)	
South	86 (43.9)
Northeast	41 (20.9)
Mid-West	39 (19.9)
West	30 (15.3)
Race, n (%)	
White	120 (61.2)
Black	15 (7.7)
Other	7 (3.6)
Unknown	54 (27.6)
Ethnicity, n (%)	
Hispanic	20 (10.2)
Non-Hispanic	114 (58.2)
Unknown	62 (31.6)
Income, n (%)	
≤$25,000	32 (16.3)
$25,001-$50,000	41 (20.9)
$50,001-$75,000	27 (13.8)
$75,001-$100,000	22 (11.2)
>$100,000	23 (11.7)
Unknown	51 (26.0)
Payer channel, n (%)	
Medicare	104 (53.1)
Commercial	67 (34.2)
Medicaid	25 (12.8)
Baseline clinical and economic characteristics	
CCI index, mean (SD)	3.6 (3.6)
Any CRAB symptoms, n (%)	114 (58.2)
Hypercalcemia	33 (16.8)
Renal impairment	39 (19.9)
Anemia	75 (38.3)
Bone lesions	28 (14.3)
Diabetes, n (%)	32 (16.3)
Peripheral neuropathy, n (%)	87 (44.4)
Hypertension, n (%)	120 (61.2)

Baseline clinical and economic characteristics (cont)	N=196[a]
Cardiovascular conditions (MI, angina, CHF, PVD), n (%)	57 (29.1)
Stroke, n (%)	8 (4.1)
Drug classes used in 12-month baseline period, n (%)	
PI	77 (39.3)
Anti-CD38 monoclonal antibody	60 (30.6)
BCMA	18 (9.2)
IMiD	14 (7.1)
Chemotherapy	151 (77.0)
Other[b]	23 (11.7)
Patients with no claims for the above classes	20 (10.2)
Baseline total all-cause costs (PPPM), mean (SD)[c,d]	$15,591 ($14,190)
Total all-cause costs from apheresis to index date, mean (SD)[e]	$59,878 ($38,833)
Baseline all-cause HCRU (PPPM), mean (SD)[c]	
Inpatient admissions	0.4 (0.7)
Average LOS	1.3 (4.4)
ER visits	0.04 (0.09)
Outpatient visits	2.7 (1.9)
Index CAR-T infusion-specific characteristics	
Year of index CAR-T infusion, n (%)	
2021	36 (18.4)
2022	160 (81.6)
Patients with available apheresis date, n (%)	152 (77.6)
Days from apheresis to index CAR-T, mean (SD)[e]	63.3 (17.3)
Patients receiving bridging therapy, n (%)[e]	130 (66.3)
Type of bridging therapy, n (%)[e]	
Chemotherapy	121 (61.7)
Corticosteroids	39 (19.9)
Other	42 (21.4)
Site of index CAR-T administration, n (%)	
Outpatient hospital	17 (8.7)
Inpatient hospital	179 (91.3)

[a]Percentages may not add up to 100 due to rounding. [b]Other includes B-cell lymphoma 2 inhibitor, nuclear export inhibitor, other monoclonal antibodies. [c]Baseline costs and HCRU are calculated in the 12-month period prior to the index date. [d]Total costs include inpatient, emergency room, outpatient, and pharmacy costs. [e]Among those with an available apheresis date and evaluated between apheresis and index date (includes costs incurred on apheresis date). BCMA, B-cell maturation antigen; CCI, Charlson comorbidity index; CAR-T, chimeric antigen receptor-T cell; CHF, congestive heart failure; CRAB, calcium, renal failure, anemia, bone lesions; ER, emergency room; HCRU, healthcare resource utilization; IMiD, immunomodulator; LOS, length of stay; MI, myocardial infarction; PI, proteosome inhibitor; PPPM, per patient per month; PVD, peripheral vascular disease; SD, standard deviation.

All-cause costs

- Mean (standard deviation [SD]) total costs from CAR-T infusion up to 30 days follow-up was $586,801 ($250,128), including CAR-T acquisition costs and infusion encounter costs ($522,920 [$201,557]). Mean (SD) total costs 31-100 and 101-180 days post-infusion were $27,485 ($32,056) and $17,869 ($46,824), respectively. **Tables 2** and **3** show costs and HCRU on a PPPM basis, respectively

TABLE 2: All-cause PPPM costs from CAR-T infusion to day 30, days 31-100, and days 101-180

All-cause costs	30 days[a] (n=153)	31-100 days (n=94)	101-180 days (n=50)
Inpatient cost PPPM, mean (SD)	$505,020 ($194,095)	$1,937 ($5,443)	$1,801 ($6,786)
Emergency room cost PPPM, mean (SD)	$57 ($491)	$59 ($369)	$4 ($28)
Outpatient cost PPPM, mean (SD)	$80,688 ($260,855)	$9,428 ($12,550)	$4,242 ($12,422)
Pharmacy cost PPPM, mean (SD)	$1,037 ($2,475)	$355 ($666)	$654 ($2,497)
Total cost PPPM, mean (SD)	**$586,801 ($250,128)**	**$11,780 ($13,738)**	**$6,701 ($17,559)**

[a]Includes CAR-T acquisition costs and infusion encounter costs. CAR-T, chimeric antigen receptor-T cell; SD, standard deviation; PPPM, per patient per month.

All-cause HCRU

TABLE 3: All-cause PPPM HCRU from CAR-T infusion to day 30, days 31-100, and days 101-180

All-cause HCRU	30 days[a] (n=153)	31-100 days (n=94)	101-180 days (n=50)
≥1 inpatient admission, n (%)	147 (96.1)	18 (19.1)	6 (12.0)
≥1 ICU visit, n (%)	48 (31.4)	2 (2.1)	0 (0)
≥1 ER visit, n (%)	8 (5.2)	8 (8.5)	1 (2.0)
≥1 outpatient visit, n (%)	143 (93.5)	90 (95.7)	39 (78.0)
Inpatient admissions PPPM, mean (SD)	1.8 (2.3)	0.4 (1.1)	0.1 (0.5)
LOS, mean (SD)	14.6 (8.1)	1.1 (3.5)	0.4 (1.1)
ER visits PPPM, mean (SD)	0.1 (0.4)	0.1 (0.2)	0.01 (0.05)
Outpatient visits, mean (SD)	9.1 (5.8)	2.7 (2.5)	1.7 (2.8)

[a]Includes CAR-T infusion visit. CAR-T, chimeric antigen receptor-T cell; ER, emergency room; HCRU, healthcare resource utilization; ICU, intensive care unit; SD, standard deviation; LOS, length of stay; PPPM, per patient per month.

KEY TAKEAWAY

Total costs and HCRU for patients with RRMM were highest in the first 30 days after CAR-T infusion (including CAR-T acquisition cost and infusion visit) and decreased in the 31-180 days after infusion.

CONCLUSION

Patients with RRMM who received CAR-T incurred $632,155 in all-cause healthcare costs through 180 days post-infusion, inclusive of CAR-T acquisition costs.

LIMITATIONS

Limitations are associated with use of administrative claims data as these data are primarily used for billing and not research purposes. Due to the open-source nature of the dataset some healthcare encounters could be missing.

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DISCLOSURES

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