CAR-T Treatment Costs Beyond Therapy Acquisition Costs in Multiple Myeloma Patients

AUTHORS: Sundar Jagannath[1], Nedra Joseph[2], Concetta Crivera[2], Carolyn Jackson[3], Satish Valluri[4], Patricia Cost[4], Hilary Phelps[4], Rafal Slowik[4], Timothy Klein[5], Lee Smolen[5], Xueting Yu[5], Adam Cohen[6]

AFFLIATIONS: [1]Icahn School of Medicine at Mount Sinai, New York, NY, USA; [2]Janssen Scientific Affairs, LLC, Horsham, PA, USA; [3]Janssen R&D, Raritan, NJ, USA; [4]Janssen Global Services, LLC, Raritan, NJ, USA; [5]Medical Decision Modeling Inc., Indianapolis, IN, USA; [6]University of Pennsylvania, Philadelphia, PA, USA

INTRODUCTION

- Ciltacabtagene autoleucel (cilta-cel), a chimeric antigen receptor T-cel (CAR-T) therapy, is a B-cell maturation antigen (BCMA)-directed genetically modified autologous T cell immunotherapy approved for the treatment of adult patients with relapsed or refractory multiple myeloma (RRMM) after four or more prior lines of therapy, including a proteasome inhibitor, an immunomodulatory agent, and an anti-CD38 monoclonal antibody.
- The acquisition cost of cilta-cel is known. However, other costs associated with cilta-cel therapy for treatment of RRMM patients, such as the required pre-, peri-, and post-infusion costs, and adverse event (AE) costs, are unknown.

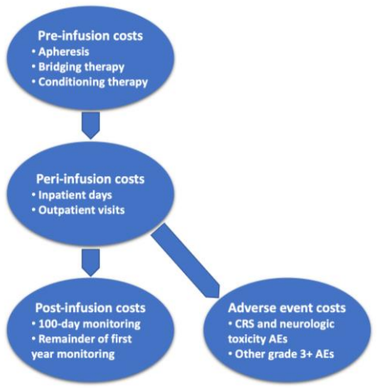
OBJECTIVES

- This study estimated per-patient average US health care costs related to cilta-cel therapy (i.e., costs separate from cilta-cel therapy acquisition) for approved RRMM patients.[1]

METHODS

- US prescribing information (USPI) for cilta-cel,[1] clinical trial data,[2,3] clinician expert opinion,[4] publicly-available medical cost databases,[5-8] and published literature[9,10] were used to identify the components and costs of pre-, peri-, and post-infusion processes as well as the costs of managing AEs associated with cilta-cel infusion (Figure 1).
- Pre-infusion costs included evaluation, apheresis, bridging therapy, and conditioning chemotherapy costs (Table 1).

FIGURE 1: Cilta-cel administration cost components



AE(s): adverse event(s); cilta-cel: ciltacabtagene autoleucel; CRS: cytokine release syndrome

METHODS (cont'd)

- Peri-infusion costs included inpatient hospital days and outpatient visits. Scenarios were analyzed for 100% inpatient administration, 85% inpatient/15% outpatient, and 70% inpatient/30% outpatient infusions.
- Post-infusion costs included first-year monitoring costs.
- AE management costs included treatment of all grades of cytokine release syndrome (CRS) and neurologic toxicity AEs, and additional Grade 3+ AEs of interest. AE rates were based on clinical trial data[1] reported in the USPI and may not reflect real-world rates with AE mitigation strategies.

TABLE 1: Cilta-cel infusion-related cost inputs

Description	Cost
Pre-infusion costs	
Apheresis [7]	$112
Bridging therapy	
Percent receiving [2,3]	82.20%
Weekly cost (3-week duration) [8]	$6,638
Conditioning therapy	
Fludarabine/Cyclophosphamide dose cost [8]	$189 / $570
Per infusion cost (3 infusions) [7]	$148
Peri-infusion costs	
Inpatient daily cost [6,10,11]	$3,215
Outpatient visit cost [7]	$92
Inpatient: Inpatient days/outpatient visits [4]	7/7
Outpatient: Inpatient days/outpatient visits [4]	1/11
Post-infusion monitoring costs	
100 days post-infusion/remainder of first year [4,7]	$3,128 / $1,455

Cilta-cel: ciltacabtagene autoleucel

TABLE 2: Cilta-cel AE-related cost inputs

Description	Rate	AE Cost
Grade 1-2 CRS [1,9,11]	89.69%	$21,208
Grade 3+ CRS without HLH/MAS [1,9,11]	4.12%	$84,893
Grade 3+ CRS with HLH/MAS [1,9,11]	1.03%	$127,528
Neurologic toxicity, Grade 1-2 [1,9,11]	14.43%	$18,496
Neurologic toxicity, Grade 3+ [1,9,11]	11.34%	$75,804
Other grade 3+ AEs (weighted) [1,5,11]	[a]	$80,969

[a] Weighted grade 3+ AE cost based on rates and costs of 20 relevant AEs; and applied to entire patient population
AE(s): adverse event(s); cilta-cel: ciltacabtagene autoleucel; CRS: cytokine release syndrome; HLH/MAS: hemophagocytic lymphohistiocytosis/macrophage activation syndrome

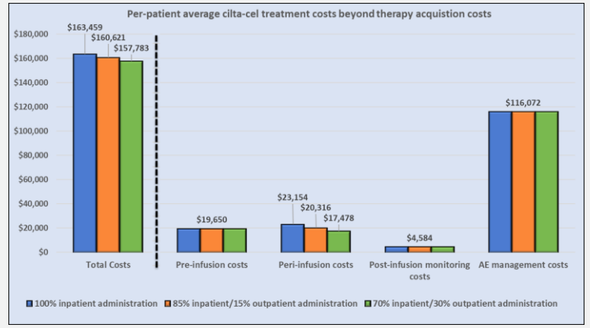
RESULTS

TABLE 3: Results for per-patient average cilta-cel pre-, peri-, and post-infusion and AE management costs

Description	Value		
Cilta-cel Inpatient / Outpatient administration (%)	**100% / 0%**	**85% / 15%**	**70% / 30%**
Pre-infusion costs [a]			
Apheresis	$112		
Bridging therapy	$16,370		
Conditioning therapy	$3,168		
Peri-infusion costs			
Inpatient day costs	$22,507	$19,613	$16,720
Outpatient visit costs	$647	$703	$758
Post-infusion monitoring costs [a]			
100 days post-infusion	$3,128		
Remainder of first year	$1,455		
AE management costs [a]			
CRS-neurologic toxicity AEs	$35,103		
Other Grade 3+ AEs	$80,969		
Total Costs	**$163,459**	**$160,621**	**$157,783**

[a] Costs were the same for inpatient or outpatient cilta-cel administration
AE(s): adverse event(s); cilta-cel: ciltacabtagene autoleucel; CRS: cytokine release syndrome; HLH/MAS: hemophagocytic lymphohistiocytosis/macrophage activation syndrome

FIGURE 2: Results



AE(s): adverse event(s); cilta-cel: ciltacabtagene autoleucel

KEY TAKEAWAYS

- Additional costs are associated with the utilization of one-time cilta-cel CAR-T therapy.
- Increased utilization of cilta-cel outpatient administration reduced costs and lowered overall inpatient days.

CONCLUSIONS

- This study quantified the overall estimated per-patient average healthcare costs associated with the use of cilta-cel CAR-T treatment in RRMM patients (outside of the acquisition cost of cilta-cel itself).
- Results from the analysis provide valuable, holistic information required by healthcare decision-makers to make informed choices regarding the use of cilta-cel.

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DISCLOSURES

SJ: consultant (BMS, Janssen, Karyopharm Therapeutics, Legend Biotech, Takeda, Sanofi). **NJ, CC:** employees of Janssen Scientific Affairs, LLC, and current equity holders in publicly-traded company. **CJ:** consultant (Memorial Sloan Kettering Cancer Center). employee of Janssen R&D. **SV, PC, HP, RS:** employees of Janssen Global Services, LLC, and current equity holders in publicly-traded company. **TK, LS, XY:** employees of Medical Decision Modeling Inc. **AC:** consultant (AstraZeneca, BMS/Celgene, Genentech/Roche, GlaxoSmithKline, Janssen, Oncopeptides, Takeda); research funding (GlaxoSmithKline, Novartis).

REFERENCES:

1. CARVYKTI™. US Prescribing Information. 2022. **2.** Madduri D, et al. Presentation at ASH; 2020. **3.** Munshi NC, et al. N Engl J Med. 2021;384(8):705-716. **4.** IET Presentation Final Report. Results from the Delphi panel 2020 and 2021. **5.** AHRQ. HCUPnet. Accessed August 3, 2021. https://hcupnet.ahrq.gov/#setup. **6.** AHRQ. Statistical Brief #125: Cancer Hospitalizations for Adults, 2009. Accessed August 31, 2021. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb125.jsp. **7.** CMS. Physician Fee Schedule Search. Accessed June 8, 2020. https://www.cms.gov/apps/physician-fee-schedule/search/search- criteria.aspx. **8.** RED BOOK Online® 2021 Pricing. Accessed June 29, 2021. http://www.micromedexsolutions.com. **9.** Hari P, et al. JCO. 2020;38(29_suppl):61-61. **10.** Institute for Clinical and Economic Review. CAR-T Therapies: Final Evidence Report. March 2018. **11.** US BLS. CPI for All Urban Consumers, US city average, Medical care. Accessed July 21, 2021. https://www.bls.gov/data/. Accessed July 21, 2021.

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