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Real-World Characteristics, Treatment Patterns, and Safety Outcomes in Black Patients With Multiple Myeloma Treated With Teclistamab: A National Claims Database Study

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Conclusions

This is the first real-world study using a nationally representative, all-payer claims data to evaluate Black patients with MM who received teclistamab

Comparing numerically, we observed that Black patients with MM had a greater baseline comorbidity burden and higher CRS rates during SUD than patients of other races. Overall, CRS was observed in less than half of patients in this real-world study, based on both ICD-10-CM codes and the Keating algorithm

However, except for lower rates of SCT in the Black patient population, prior treatment and teclistamab treatment patterns, including the probability of switch to LFD schedules, appeared similar between Black patients and patients of other races

Switching from weekly to less frequent dosing was observed in the real-world. The probability of switching from weekly to less frequent dosing schedules was similar between Black patients and patients of other races

The similar proportion of teclistamab-treated Black patients in our study to the proportion of overall Black patients with newly diagnosed MM in the registry suggests strong real-world accessibility of teclistamab in the US and indicates similar medical management for both Black patients and patients of other races with MM

The study limitations include a small sample size for the Black cohort, short follow-up, and no statistical tests conducted to compare differences. Additionally, claims data have inherent limitations such as coding errors, misclassification, and incomplete information

Further research with a larger study size and longer follow-up is needed to assess longitudinal outcomes, barriers to access, and to confirm our findings

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Introduction

- Multiple myeloma (MM) is twice as prevalent among Black individuals as in White Americans in the United States (US).[1] Compared to patients of European descent, Black patients with MM are 2 times more likely to be diagnosed with MM and to have a higher mortality rate.[1-3]
- Additionally, prior evidence demonstrated disparities in access to innovative therapies and underrepresentation in clinical trials for Black patients with MM[4]
- Teclistamab, a first-in-class B-cell maturation antigen (BCMA) x CD3 bispecific antibody, was approved to treat patients with relapsed/refractory MM through the pivotal MajesTEC-1 trial, which included 21 (12.7%) Black patients[5,6]
- In the real-world, recent literature demonstrated higher percentages of Black patients with MM receiving teclistamab as compared numerically to the percentage of Black patients enrolled in the MajesTEC-1 trial.[7,8] Furthermore, a cross-sectional analysis of patients with newly diagnosed MM in 2021, using the All-payer Real-world Multiple Myeloma Research-ready Data (ARMMRD) registry, found that 14.7% were Black race[9]
- To date, no known real-world study has sought to understand access and outcomes for Black patients with MM receiving teclistamab in the real-world

Objective

- To understand access and outcomes for Black patients with MM, we sought to describe patient characteristics, treatment patterns, and safety outcomes in Black patients with MM receiving teclistamab in the real-world

Methods

- We performed a retrospective observational cohort study using de-identified data from the ARMMRD registry, derived from the STATinMED RWD Insights all-payer claims data (covering approximately 87% of the insured population in the US) from January 1, 2014, to January 31, 2024 (the study period)

Study population

- Adult patients (≥18 years of age) with MM who had ≥1 teclistamab claim in the ARMMRD registry between October 26, 2022, and January 31, 2024 (the identification period) were included in this study (**Figure 1**)
- The index date was defined as the date of the earliest outpatient claim of a teclistamab 30 mg/3 mL vial or the admission date of the earliest hospitalization encounter that contained teclistamab
- Patients were required to have continuous eligibility in pharmacy and medical benefit for ≥6 months prior to index date (pre-index period)
- Patients who received teclistamab before or on October 25, 2022, were excluded

Cohort identification

- Patients in the ARMMRD registry who met the following criteria were defined as having a complete step-up dosing (SUD) period:
  - Had ≥1 inpatient admission containing teclistamab or ≥1 outpatient claim for a 30 mg/3 mL vial for teclistamab; the earliest admission date (if inpatient) or claim date (if outpatient) was defined as the start date of the SUD period
  - All inpatient or outpatient claims for teclistamab with a <5-day gap between claims within a 21-day continuous enrollment period were rolled up as part of the SUD period. If an index claim was outpatient, an additional outpatient claim for a 153 mg/1.7 mL vial for teclistamab was required unless an inpatient admission containing teclistamab was observed
  - The end date of the SUD period was the discharge date if the last encounter was an inpatient admission, or the claim date +4 days if the last encounter was an outpatient claim for a 153 mg/1.7 mL vial

Data analysis

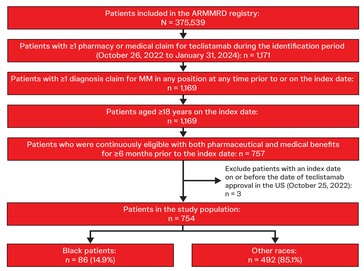
- Three cohorts were described: (1) overall patient population, which includes patients with unknown race, (2) Black patients, and (3) patients of other races
- Demographics and clinical characteristics were captured on or during the 6-month pre-index period (the baseline period) among all patients
- Treatment history was captured using all available pre-index data among patients with ≥1 line of therapy (LOT) data available in the ARMMRD registry
- Health resource utilization (HRU) during the SUD period, cytokine release syndrom (CRS) and immune effector cell-associated neurotoxicity syndrome (ICANS) rates, and dosing schedule for teclistamab were evaluated in patients with a complete SUD period
  - CRS was identified in 2 ways: (1) using the International Classification of Disease, 10th Revision, Clinical Modification (ICD-10-CM) codes and (2) using a published algorithm of CRS-related symptoms and treatment codes (Keating algorithm)[10]
  - ICANS was also identified in 2 ways: (1) using ICD-10-CM codes and (2) using ICD-10-CM symptom codes
- Baseline patient characteristics were analyzed descriptively. Mean and standard deviation (SD), median, and interquartile range (IQR) as well as minimum and maximum were reported for continuous variables; counts and percentages were reported for categorical variables
- Switching to a less-frequent dosing (LFD) schedule was defined as having ≥3 consecutive teclistamab records with a dose interval of ≥14 days between each dose
- Time to LFD was analyzed using Kaplan-Meier curves; patients were censored at the earliest date of the following: death, last activity, end of the study, or the initiation of a next LOT

Results

Demographics

- A total of 754 patients with ≥1 claim for teclistamab were included in the study (**Figure 1**). 86 (14.9%) were Black, similar to the proportion of Black patients in the database with newly diagnosed myeloma (16.0%), and 492 (85.1%) were other races (White: 471 [95.7%]; Asian: 21 [4.3%]). Patient demographics are summarized in **Table 1**
- The majority of patients in other races were White (95.7%) with the remaining being Asian (4.3%)
- The median (range) age of all included patients was 71 (31-85) years; similar median age was seen in both the Black patients and patients of other races. However, a higher proportion of Black patients were aged <65 years than patients of other races
- Compared numerically to patients of other races, higher percentages of Black patients were from the Northeast (31.4% vs 18.5%) or the South (39.5% vs 28.9%), and covered by Medicaid (22.1% vs 7.9%); a lower percentage of Black patients were covered by Medicare Fee-For-Service (45.3% vs 67.5%) or had a commercial health plan (10.5% vs 15.0%) than patients of other races

Figure 1: Study population



Abbreviations: ARMMRD, All-payer Real-world Multiple Myeloma Research-ready Data.

TABLE 1: Demographics of patients with MM treated with teclistamab

	Overall N = 754[a]	Black N = 86	Other races N = 492[b]
Age, years			
Median (IQR)	71 (13)	69 (14)	69 (14)
Min, max	31, 85	47, 84	31, 85
Age categories, years, n (%)			
<65	209 (27.7)	33 (38.4)	116 (23.6)
65 to 70	133 (17.6)	12 (14.0)	90 (18.3)
70 to 75	167 (22.1)	15 (17.4)	117 (23.8)
≥75	245 (32.5)	26 (30.2)	169 (34.3)
Sex, n (%)			
Male	388 (51.5)	38 (44.2)	254 (51.6)
Female	366 (48.5)	48 (55.8)	238 (48.4)
Race, n (%) of patients with race information available			
White	471 (81.5)	0 (0)	471 (95.7)
Black	86 (14.9)	86 (100)	0 (0)
Asian	21 (3.6)	0 (0)	21 (4.3)
Ethnicity, n (%) of patients with ethnicity information available			
Hispanic	78 (14.4)	11 (14.1)	67 (15.0)
Non-Hispanic	464 (85.6)	67 (85.9)	379 (85.0)
Region			
Northeast	149 (19.8)	27 (31.4)	91 (18.5)
Midwest	203 (26.9)	22 (25.6)	148 (30.1)
South	235 (31.2)	34 (39.5)	142 (28.9)
West	167 (22.1)	3 (3.5)	111 (22.6)
Payer type, n (%)			
Commercial	107 (14.2)	9 (10.5)	74 (15.0)
Medicaid	90 (11.9)	19 (22.1)	39 (7.9)
Medicare FFS	467 (61.9)	39 (45.3)	332 (67.5)
Medicare Advantage	89 (11.8)	19 (22.1)	46 (9.3)
Other insurance	1 (<1)	0 (0)	1 (<1)

Abbreviations: FFS, fee-for-service; IQR, interquartile range.
[a]Includes patients with missing race information.
[b]Includes all other known races.

Patient clinical characteristics

- The mean (SD) Quan-Charlson Comorbidity Index (QCI) score was 4.1 (3.8), excluding MM, for the overall patient population; the mean QCI score was higher for Black patients than for patients of other races (4.9 vs 3.9) (**Table 2**)
- Compared numerically to patients of other races, Black patients had a higher prevalence of baseline comorbidities, including hypertension, anemia, infections, renal impairment/failure, any malignancy, metastatic solid tumor, chronic pulmonary disease, and osteoarthritis (**Table 2**)

TABLE 2: Baseline clinical characteristics of patients with MM treated with teclistamab

	Overall N = 754[a]	Black N = 86	Other races N = 492[b]
QCI score			
Mean (SD)	4.1 (3.8)	4.9 (3.8)	3.9 (3.7)
Median (IQR)	3 (5)	4 (5)	3 (5)
Min, max	0, 17	0, 14	0, 16
QCI categorical scores, n (%)			
0	167 (22.1)	8 (9.3)	119 (24.2)
1	63 (8.4)	6 (7.0)	43 (8.7)
2	118 (15.6)	18 (20.9)	68 (13.8)
≥3	406 (53.8)	54 (62.8)	262 (53.3)
Key relevant comorbidities and conditions of interest, n (%)			
Hypertension	460 (61.0)	64 (74.4)	299 (60.8)
Anemia	439 (58.2)	62 (72.1)	283 (57.5)
Infections[c]	331 (43.9)	43 (50.0)	217 (44.1)
Renal impairment/failure[d]	318 (42.2)	42 (48.8)	203 (41.3)
Peripheral neuropathy	284 (37.7)	31 (36.0)	192 (39.0)
Hypogammaglobulinemia	203 (26.9)	15 (17.4)	141 (28.7)
Metastatic solid tumor	201 (26.7)	26 (30.2)	129 (26.2)
Any malignancy[e]	198 (26.3)	25 (29.1)	127 (25.8)
Lytic bone lesions	184 (24.4)	24 (27.9)	115 (23.4)
Congestive heart failure	166 (22.0)	24 (27.9)	107 (21.7)
Chronic pulmonary disease	150 (19.9)	25 (29.1)	93 (18.9)
Neutropenia	144 (19.1)	20 (23.3)	95 (19.3)
Osteoarthritis	139 (18.4)	22 (25.6)	82 (16.7)
Hypercalcemia	100 (13.3)	11 (12.8)	73 (14.8)
Lymphocytopenia	85 (11.3)	11 (12.8)	55 (11.2)
COPD	66 (8.8)	14 (16.3)	42 (8.5)
Extramedullary disease	31 (4.1)	4 (4.7)	19 (3.9)

Abbreviations: COPD, chronic obstructive pulmonary disease; IQR, interquartile range; QCI, Quan-Charlson Comorbidity Index; SD, standard deviation.
[a]Includes patients with missing race information.
[b]Includes patients of all other known races.
[c]Includes COVID-19, pneumonia, upper respiratory tract infection, sinusitis, fungal infections, hepatitis B or C, *C. difficile* infection, bacteremia, pneumocystic jiroveci pneumonia, and tuberculosis.
[d]Includes all stage chronic kidney disease, dialysis, end-stage renal disease, kidney transplant, and kidney failure.
[e]Includes lymphoma and leukemia but not malignant neoplasm of the skin.

Treatment history

- Of the 236 patients with evaluable treatment history, 36 (15.3%) had prior exposure to BCMA-targeted therapy; the percentage of patients with prior BCMA exposure was comparable between Black patients (16.1%) and patients of other races (15.8%) (**Table 3**)
- Fewer Black patients received prior stem cell transplantation (SCT) compared to patients of other races (35.5% vs. 45.5%)

HRU during SUD

- Of 384 patients with observed complete SUD by data cutoff, 297 (77.3%) completed teclistamab SUD in 1 inpatient admission. Of 87 patients with >1 encounter during SUD, 3 (3.4%) were all inpatient admissions, 19 (21.8%) were all outpatient admissions, and 65 (74.7%) were hybrid inpatient/outpatient admissions with 63/65 (96.9%) initial encounters being inpatient admissions versus 2 initial encounters that were outpatient
- Among 44 Black patients with observed complete SUD, 43 (97.7%) had ≥1 teclistamab-related hospitalization during the SUD period; among 257 patients of other races with observed complete SUD, 242 (94.2%) had ≥1 teclistamab-related hospitalization during the SUD period
- During SUD, Black patients had proportionally smaller ICU visits (n=2; 5% vs. n=48; 18.7%) and outpatient visits (n=20; 45.5% vs. n=152; 59.1%) versus patients of other races

Table 3: Treatment history of patients with MM treated with teclistamab

	Overall[a] N = 263	Black N = 37	Other races[b] N = 178
Patients with prior LOT information available, n (%)	236 (89.7)	31 (83.8)	165 (92.7)
Prior BCMA-directed therapies, n (%)[c]	36 (15.3)	5 (16.1)	26 (15.8)
CAR-T therapy (Abecma®, Carvykti®)	19 (8.1)	3 (9.7)	14 (8.5)
Abecma®	1 (<1)	1 (3.2)	0 (0)
Carvykti®	18 (7.6)	2 (6.5)	14 (8.5)
ADC (belantamab mafodotin)	21 (8.9)	3 (9.7)	15 (9.1)
Stem cell transplantation, n (%)[c]	98 (41.5)	11 (35.5)	75 (45.5)
Time from the end of the most recent LOT to the index date, days			
Mean (SD)	194.4 (389.5)	233.2 (486.0)	195.8 (403.1)
Median (IQR)	40 (148)	20 (180)	41 (133)
Duration of the most recent LOT, days			
Mean (SD)	166.2 (184.8)	175.8 (177.5)	164.3 (188.7)
Median (IQR)	110 (148)	139 (119)	104 (145)

Abbreviations: ADC, antibody drug conjugate; BCMA, B-cell maturation antigen; CAR-T, chimeric antigen receptor; IQR, interquartile range.
[a]Includes all patients who met the criteria for evaluation of treatment history, including those with missing race information.
[b]Includes all patients of other known races who met the criteria for evaluation of treatment history.
[c]Among patients with prior LOT information available.

Table 4: CRS and ICANS among patients who completed SUD

	Overall N = 384[a]	Black N = 44	Other races N = 257[b]
rwCRS events per ICD-10 codes			
Patients with ≥1 CRS event, n (%)	150 (39.1)	18 (40.9)	94 (36.6)
Patients with grade 1 events, n (%)[c]	100 (26.0)	11 (25.0)	58 (22.6)
Patients with grade 2 events, n (%)[c]	29 (7.6)	5 (11.4)	22 (8.6)
Patients with grade ≥3 events, n (%)[c]	3 (<1)	1 (2.3)	2 (<1)
Patients with CRS grade unknown or unspecified, n (%)	18 (4.7)	1 (2.3)	12 (4.7)
rwCRS events per Keating classifications			
Patients with any grade CRS (loose definition)	128 (33.3)	18 (40.9)	74 (28.8)
Patients with mild CRS	100 (26.0)	15 (34.1)	59 (23.0)
Patients with severe CRS	28 (7.3)	3 (6.8)	15 (5.8)
Patients with specific rwCRS symptoms per Keating algorithm			
Fever	82 (21.4)	12 (27.3)	47 (18.3)
Fatigue	44 (11.5)	4 (9.1)	28 (10.9)
Hypotension	16 (4.2)	4 (9.1)	10 (3.9)
Hypoxia	4 (1)	0 (0)	3 (1.2)
Headaches	1 (<1)	0 (0)	1 (<1)
rwICANS per ICD-10 codes			
Patients ≥1 ICANS and/or other neurotoxicity event, n (%)	40 (10.4)	5 (11.4)	30 (11.7)
Patients with grade 1 events, n (%)[c]	9 (2.3)	2 (4.5)	6 (2.3)
Patients with grade 2 events, n (%)[c]	8 (2.1)	2 (4.5)	5 (1.9)
Patients with grade 3 events, n (%)[c]	2 (<1)	0 (0)	2 (<1)
Patients with grade ≥4 events, n (%)[c]	0 (0)	0 (0)	0 (0)
Patients with ICANS grade unknown or unspecified, n (%)	21 (5.5)	1 (2.3)	17 (6.6)
ICANS per symptom codes			
Patients with ≥1 ICANS symptom code	22 (5.7)	5 (11.4)	13 (5.1)
Encephalopathy	6 (1.6)	1 (2.3)	5 (1.9)
Delirium	13 (3.4)	2 (4.5)	8 (3.1)
Agitation	3 (<1)	1 (2.3)	2 (0.8)
Seizure	3 (<1)	2 (4.5)	0 (0)

Abbreviations: CRS, cytokine release syndrome; ICANS, immune effector cell-associated syndrome; ICD-10, International Classification of Diseases, 10th Revision; rw, real-world; SD, standard deviation
[a]Includes patients with missing race information.
[b]Includes all other known races.
[c]If there was more than 1 grade of CRS or ICANS events, the event with the highest grade was counted.

Real-world CRS and ICANS during SUD

- Of the 384 patients with a complete SUD period, 150 (39.1%) had ≥1 CRS event per ICD-10-CM codes, and 128 (33.3%) per the Keating algorithm (**Table 4**). Most of the CRS events were low grade (26.0% grade 1; 7.6% grade 2) or mild (26.0%)
- Compared to patients of other races, higher percentages of Black patients had ≥1 CRS event per both ICD-10-CM codes (40.9% vs 36.6%) and the Keating algorithm (40.9% vs 28.8%) with fever as the most common symptom related to CRS (27.3% vs 18.3%)
- The ICANS rates were comparable in Black patients (11.4%) and patients of other races (11.7%), and most of the ICANS events were grade 1 or 2
- Claims for tocilizumab were observed during the SUD period in a total of 28 patients (7.3%), including 3 Black patients (6.8%) and 16 patients of other races (6.2%)

LFD schedule

- At a median follow-up of 15.7 weeks for Black patients and 13.9 weeks for patients of other races, post-SUD LFD was observed in 15 Black patients and 87 patients of other races
- The median time to LFD was 5.8 (IQR, 4.9–6.5) months in the overall patient population, 5.0 (2.6–6.6) months in Black patients, and 5.6 (4.9–6.5) months in patients of other races
- The probability of switching to LFD at 3, 6, and 9 months post-index was 30.2%, 52.1%, and 66.4%, respectively, (**Figure 2A**); no difference between Black patients and patients of other races was observed (**Figure 2B**)

Figure 2 : Probability of LFD in (A) all patients and (B) Black patients versus patients of other races

	N	Event	Censored	Median (95% CI)
All patients	384	129	255	5.8 (4.9-6.5)

Subgroup	N	Event	Censored	Median (95% CI)
Black	44	15	29	5.0 (2.6-6.6)
Others	257	87	170	5.6 (4.9-6.5)

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