Real-world Evidence on Treatment Patterns, Costs and Healthcare Resource Utilization Associated with Waldenström Macroglobulinemia in the Veteran Health Administration Population

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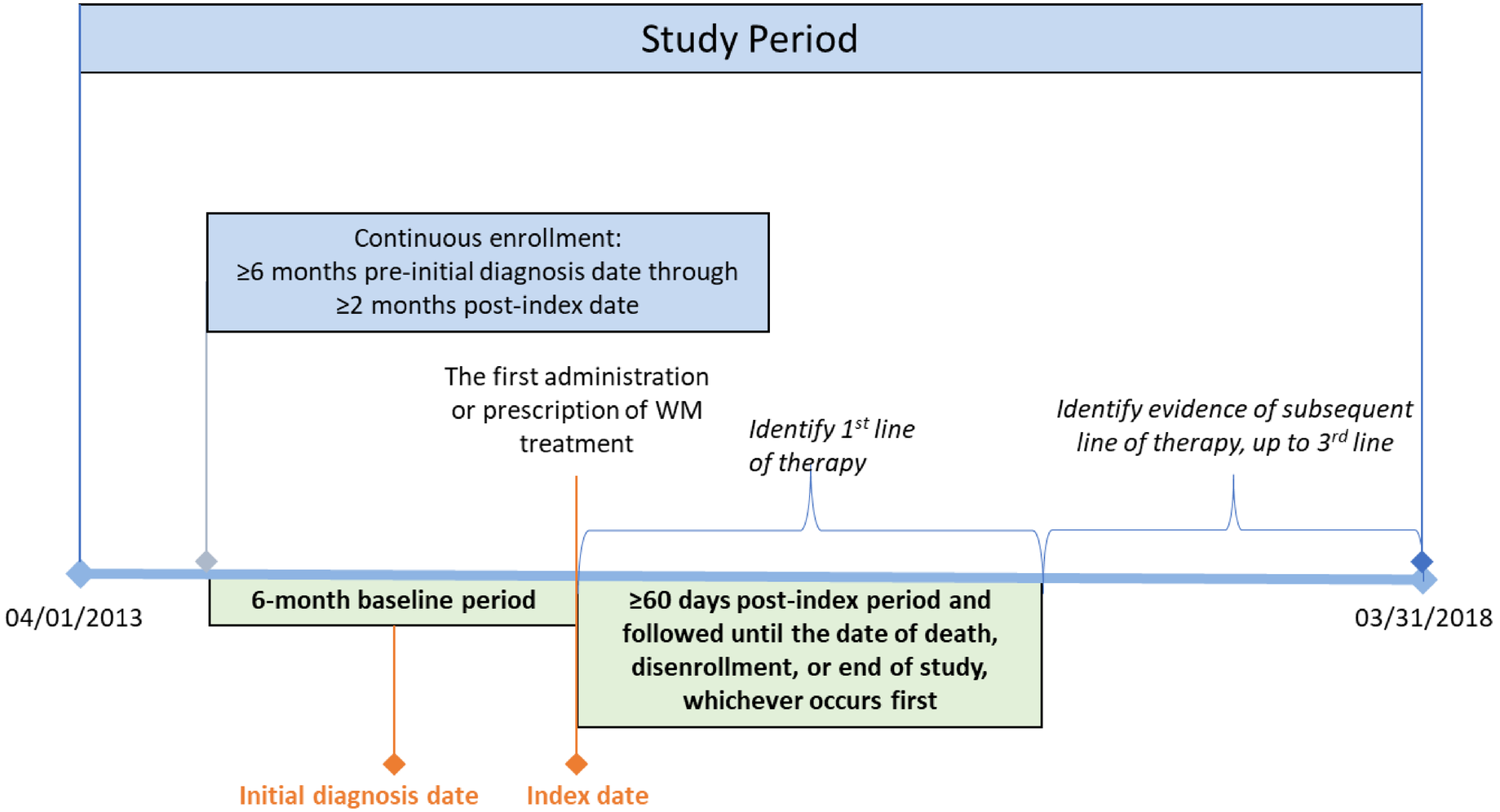
Background

- Waldenström macroglobulinemia (WM) is a rare, incurable non-Hodgkin Lymphoma
- There is limited real-world evidence on WM treatment and disease burden among US veteran patients

Objectives

- To describe WM epidemiology including its prevalence and incidence
- To evaluate the real-world treatment patterns, and associated clinical as well as economic outcomes among VA patients with WM

Methods – Study Design



- **Data source:** The Veterans Health Administration (VHA) database population
- **Study population:** Adults who had ≥2 visits with WM diagnosis codes (ICD-9-CM: 273.3 or ICD-10-CM: C88.0) and ≥1 WM treatment(s) were identified in the VHA database from April 01, 2014 to July 31, 2018
- **Index date:** The first date of WM treatment
- **Inclusion criteria:** Patients included were newly diagnosed, initiating treatment, and enrolled continuously for 6 months prior to and ≥60 days following index date

Methods – Treatment Regimen

Treatment regimen:

- The combination of all agents used within the first 60 days of WM treatment initiation
- Mutually-exclusive categories:
  - Rituximab monotherapy
  - Ibrutinib-based
  - Chemotherapy-based
  - Proteasome inhibitor-based
  - Other regimens

Line of therapy:

- The start of a new line of therapy is defined as the addition of a new agent >60 days from previous line or as treatment restart following a >90-day therapy gap

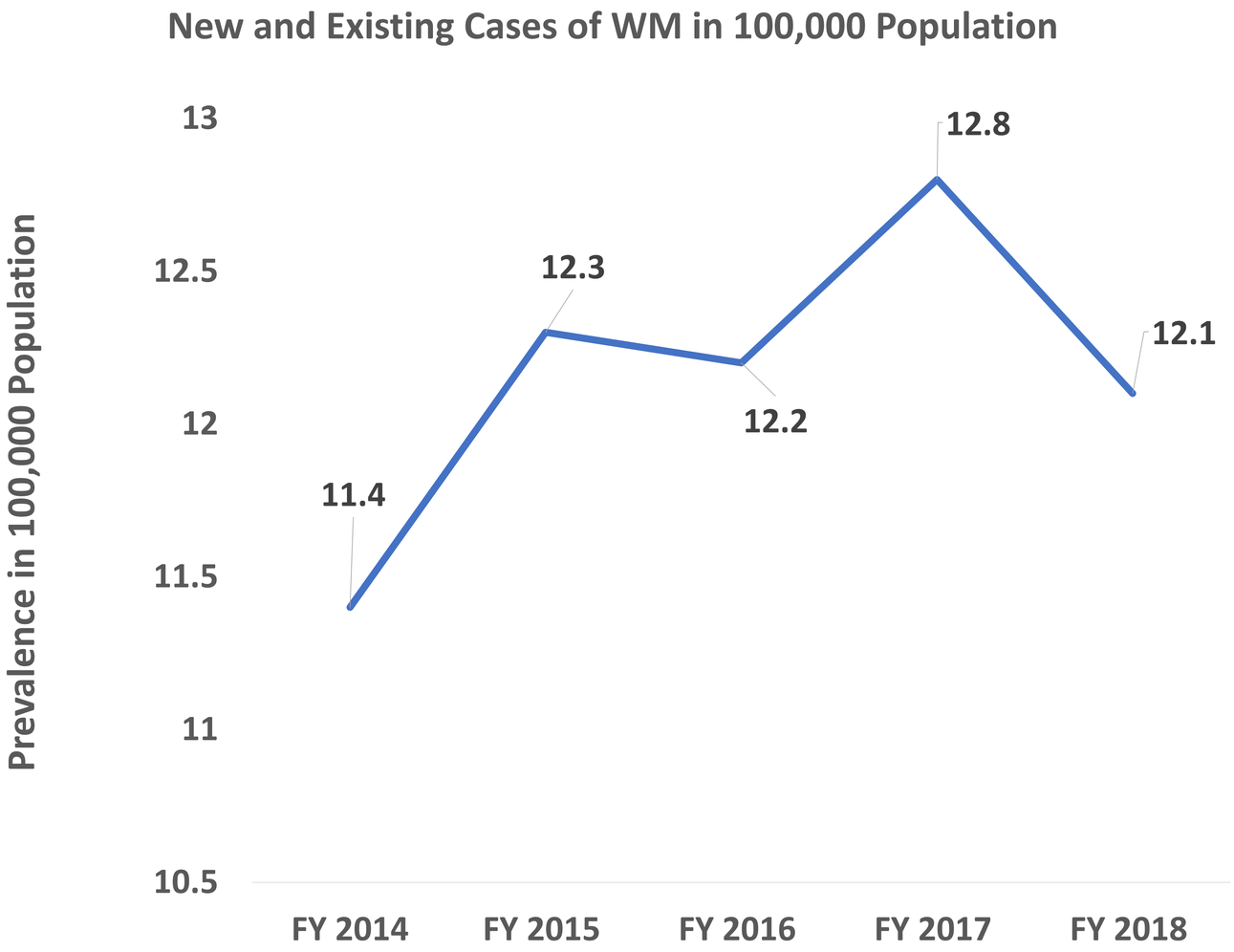
Outcomes:

- Healthcare resource utilization: hospitalization, length-of-stay (LOS)
- Total costs: calculated as the sum of inpatient, outpatient and pharmacy costs per-patient-per-month (PPPM)
- Treatment regimens, healthcare resource utilization, and total costs were examined by 1st, 2nd, and 3rd line of therapy

Results – WM Epidemiology in VHA Population

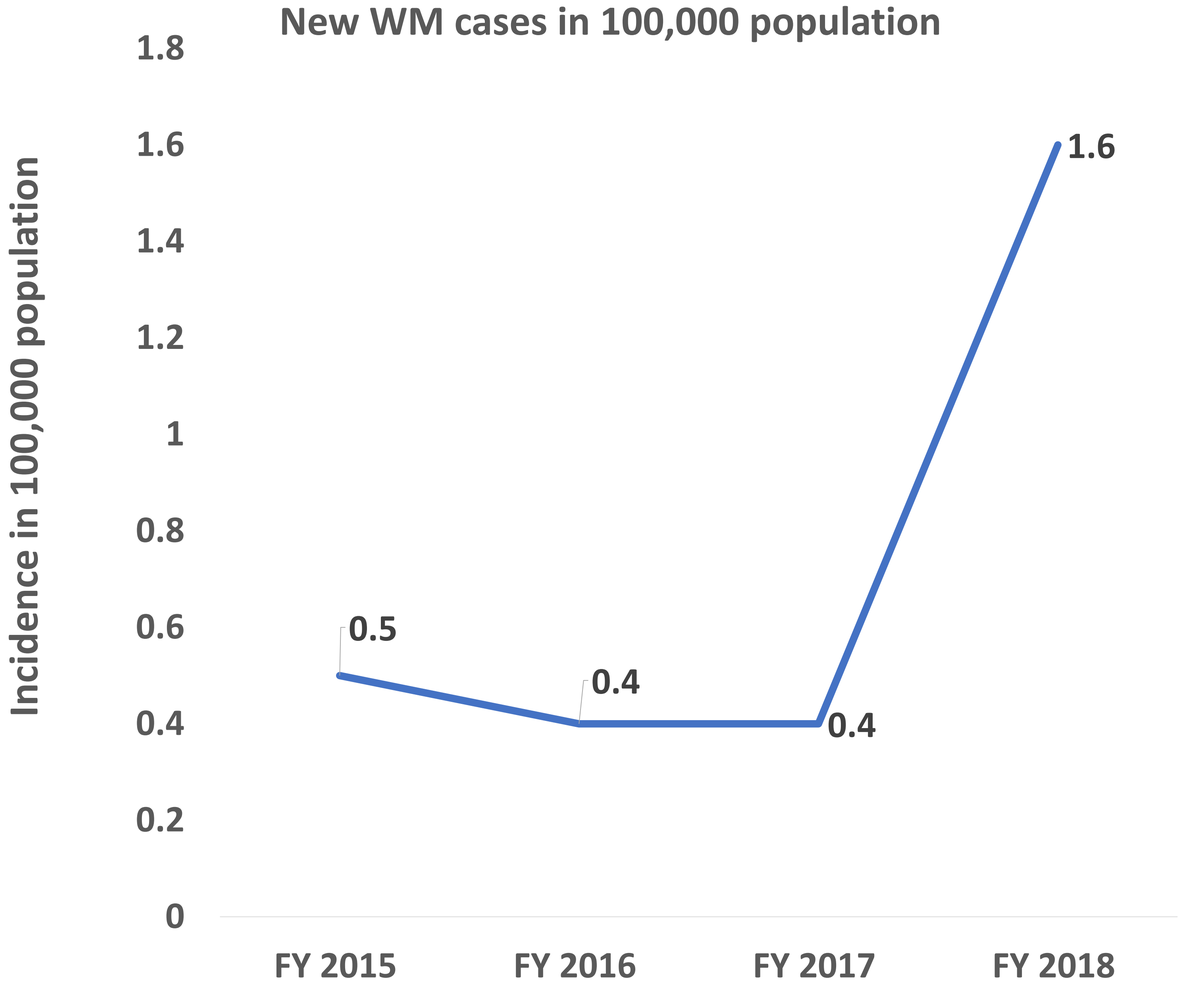
Prevalence: 11.4-12.8 cases per 100,000 persons

Prevalence of WM in VHA by Fiscal Year (FY)



Incidence: 0.5-1.6 cases per 100,000 persons

Incidence of WM in VHA by Fiscal Year (FY)



Results – Patient Characteristics

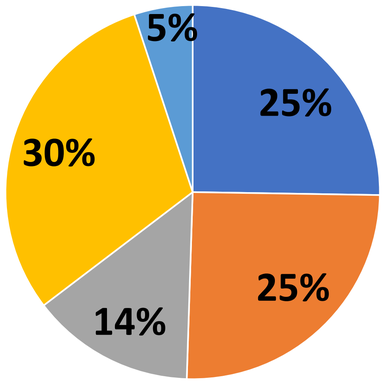
Baseline Characteristics of WM Patients in the VHA Population

	All WM Patients (N=255)	
	N	%
Age		
Mean (SD)	73.1 (8.9)	
Median	72	
35-54	7	3%
55-64	21	8%
≥65	227	89%
Sex		
Male	252	99%
Female	3	1%
Race		
White	214	84%
African American	23	9%
Hispanic	10	4%
Other	8	3%
Comorbidity		
Any Cardiovascular Comorbidity	168	66%
Acute or Chronic Kidney Disease	43	17%
Anemia	139	55%
Diabetes	55	22%
Charlson Comorbidity Index Score (Mean)	1.2	

- Patients were a median age of 72 years
- The study population was mostly male (99%) and white (85%)
- Approximately two-thirds of VHA patients have at least one of the following cardiovascular comorbid conditions: arterial thrombosis, atrial fibrillation, cardiac arrhythmia, cardiac valvular disease, cerebrovascular disease, hypertension, myocardial infarction/coronary artery disease, venous thrombosis, dyslipidemia and thrombocytopenia
- Anemia and cardiovascular conditions were the most common baseline comorbidities

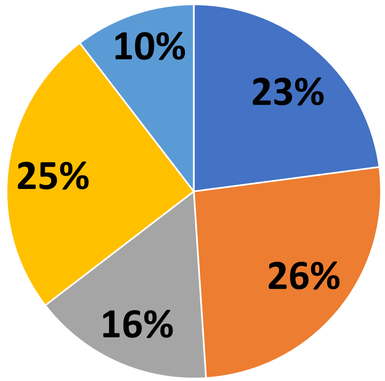
Results – Treatment Patterns for Each Line of Therapy

First Line (n-255)



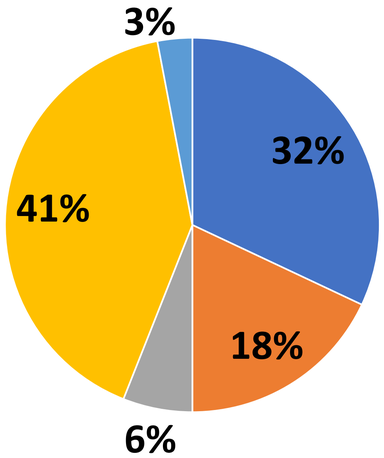
- **Rituximab Monotherapy: 25% (n=65)**
- **Chemotherapy-based: 25% (n=65)**
- **Proteasome-inhibitors +/- Rituximab: 14% (n=35)**
- **Ibrutinib: 30% (n=76)**
- **Other: 5% (n=14)**

Second Line (n=96)



- **Rituximab Monotherapy: 23% (n=22)**
- **Chemotherapy-based: 26% (n=25)**
- **Proteasome-inhibitors +/- Rituximab: 16% (n=15)**
- **Ibrutinib: 25% (n=24)**
- **Other: 10% (n=10)**

Third Line (n=34)

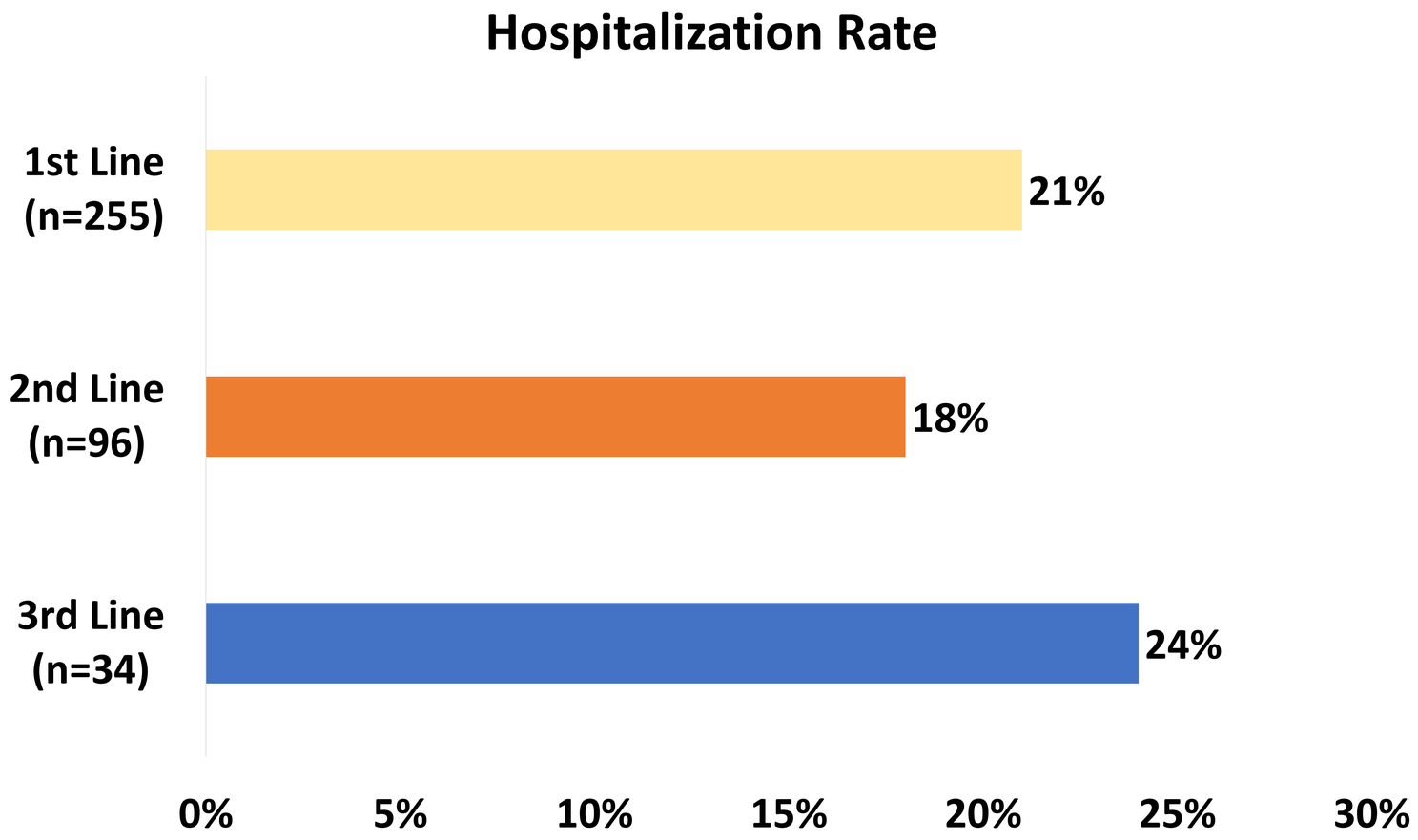


- **Rituximab Monotherapy: 32% (n=11)**
- **Chemotherapy-based: 18% (n=6)**
- **Proteasome-inhibitors +/- Rituximab: 6% (n=2)**
- **Ibrutinib: 41% (n=14)**
- **Other: 3% (n=1)**

- A total of 255 patients received 1st line (mean duration: 289 days); 96 (38%) patients received 2nd line (mean duration: 267 days), and 34 (13%) received 3rd line therapy (mean duration: 253 days)
- Treatment patterns for each line of therapy were as follows:
  - **1st line**: ibrutinib-based (30%), chemotherapy-based (25%), rituximab monotherapy (25%), proteasome inhibitor-based (14%), and other (5%)
  - **2nd line**: chemotherapy-based (27%), ibrutinib-based (24%), rituximab monotherapy (23%), proteasome inhibitor-based (15%), and other (9%)
  - **3rd line**: ibrutinib-based (41%), rituximab monotherapy (32%), chemotherapy-based (18%), proteasome inhibitor-based (6%), and other (3%).

Results – Hospitalization Rates associated with WM

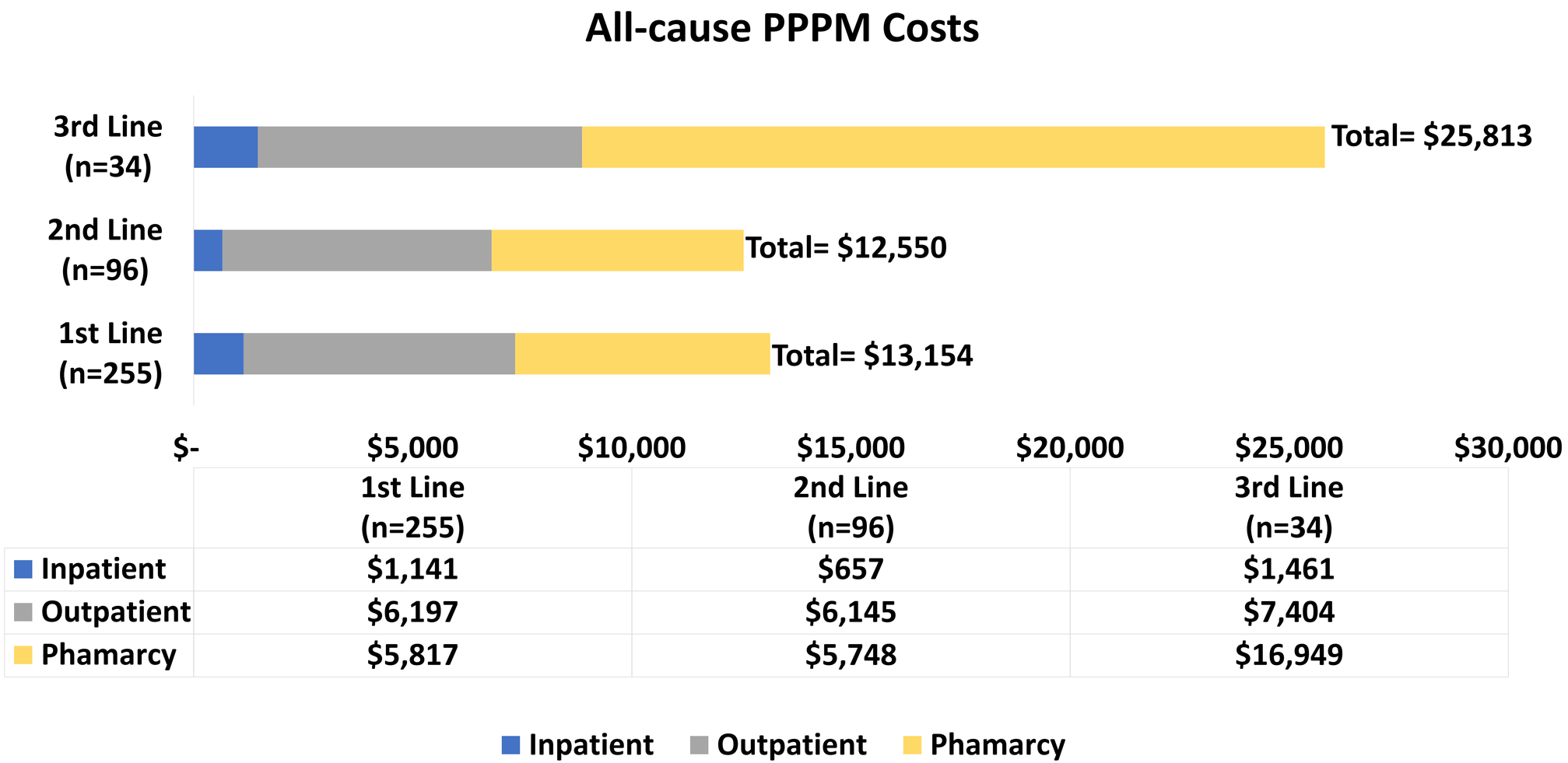
- The overall hospitalization rate was 29% with an average length of stay (LOS) of 12 days
- Approximately 21% (LOS: 10.9 days), 18% (LOS: 6.9 days), and 24% (LOS: 7.3 days) of patients had a hospitalization, respectively, during 1st, 2nd, and 3rd line therapy



Line of Therapy	LOS
1st Line	10.9 days
2nd Line	6.9 days
3rd Line	7.3 days

Results –Total Costs associated with WM

- Average total per patient per month (PPPM) costs for VA patients with WM were $13,007 overall, and $13,154, $12,550, and $25,813 during 1st,2nd, and 3rd line therapy, respectively



	1st Line (n=255)	2nd Line (n=96)	3rd Line (n=34)
Inpatient	$1,141	$657	$1,461
Outpatient	$6,197	$6,145	$7,404
Phamarcy	$5,817	$5,748	$16,949

Limitations

- Due to the nature of administrative claims-based studies, findings are subject to potential miscoding or diagnoses entered for administrative processing
- Some eligible VA beneficiaries over the age of 65 may have also received services for which CMS was the primary payer, and those claims were not visible in the VA database.
- The VHA database predominantly consist of male patients with prior military service so the generalizability may be limited

Conclusions

- Ibrutinib monotherapy, rituximab monotherapy, and chemotherapy-based regimens were the most common treatments among 1st line, 2nd line, and 3rd line patients, respectively
- All-cause hospitalization rate and total costs were highest in patients who received a 3rd line of therapy
- There remains significant clinical and economic burden associated with WM among the US veteran population
- Future studies are needed to further understand the variance between treatment patterns and associated economic impact of treatment selection