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Population-level Projections for Multiple Myeloma Patients by Line of Therapy in the USA

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Background

Introduction

Multiple myeloma (MM) is a hematopoietic neoplasm of plasma cells. Improperly formed plasma cells accumulate in the bone marrow, causing bone marrow failure and bone destruction.¹ While MM is rarely curable, treatment for MM has evolved over time, leading to improved survival duration for patients.

MM patients may receive a variety of combination regimens or single agents for each line of therapy over the course of the disease, resulting in a wide variety of treatment journeys.^{2,3} Current data on real world clinical practice, such as the number of patients eligible for a given line of therapy and the overall time within that line of therapy (LOT), is limited.^{3,4}

No published study to date has combined national registry data for MM with treatment data from physician surveys to project the number of MM systemic therapy treated patients by line in the US.

1. National Cancer Institute. Plasma Cell Neoplasms (including Multiple Myeloma). 2019. 2. Palumbo A, Anderson K. *The New England Journal of Medicine* 2011;364:1046-60. 3. Remes K, et al. *PloS One* 2018;13:e0208507. 4. Mohty M, et al. *Clinical Lymphoma, Myeloma & Leukemia* 2018;18:e401-e19.



Background

Aims

To report results of a patient epidemiology model for MM treatment by LOT in the USA including:

- 1) The number of incident patients with MM.
- 2) The complete prevalence of MM (number of patients living with MM in US).
- 3) The number of unique MM patients treated with systemic therapy by line (from first line through fifth line).



Methods

Study Design

- Retrospective, population-based, secondary data analysis of MM in the USA.
- Data were analyzed using descriptive methods.

Data Sources

- The Surveillance, Epidemiology and End Results (SEER) cancer registry.¹
- The Kantar, Health Division, oncology epidemiology dataset CancerMPact® Patient Metrics.²
- Results of a physician survey (sample size = 70 in 2018 & 75 in 2019) conducted by Kantar, Health Division (CancerMPact® Treatment Architecture).³

Incidence Calculation

- Age- and gender-specific incidence rates were obtained from SEER for all available years through 2016.
- Based on the observed trend, the incidence rates were further projected to 2025.
- The annual age-specific rates by gender were multiplied by the respective projected annual age- and gender-specific US population to estimate the number of incident MM patients.⁴

1. National Cancer Institute. Surveillance, Epidemiology, and End Results (SEER) Program. 2020. 2. Kantar - Health Division. CancerMPact® Patient Metrics 2020 [cited 2020 Sep, 22th, 2020]. Available from: www.cancermpact.com. 3. Kantar - Health Division. CancerMPact® Treatment Architecture 2020 [cited 2020 Sep, 22th, 2020]. Available from: www.cancermpact.com. 4. U.S. Census Bureau. 2014 to 2060 Population Projections based on Census 2010. 2014.



Methods

Complete Prevalence calculation

- Complete Prevalence is the estimate of cases that have been diagnosed at any time in the past and have survived to the given year.
- Complete Prevalence (ComPrev) software from the NCI was used to calculate completeness indexes that represent the percent of "completeness" of limited duration prevalence as defined by the NCI.¹

Treatment Data

- We extracted data regarding the percentage of patients treated by line from the CancerMPact® Treatment Architecture (TA) survey (2018 and 2019) for MM that recruited and surveyed 70 US physicians using an online format.

Annual Prevalent Patients by LoT

- Defined as the number of MM patients who received a line therapy at any point in the given year, and who had not yet progressed to the next LoT.
- To calculate the number of unique patients during a given year who were on a specific LoT, the mean progression-free survival (PFS) of the LoT in months was calculated based on data from the 2018–2019 CMP TA physician surveys.
- The total estimate of MM patients on a LoT among prevalent patients was calculated using the annual estimate of patients initiating a line by year, divided by total months per year, then multiplied by the average PFS in months for that line.

1. National Cancer Institute. Complete Prevalence Program, Version 3.0.23 (BETA). 2019.



Results

An increase in the total number of MM cases in the USA is projected from 2020 to 2025

Table 1. Projected Incidence and Complete Prevalence for MM in the US 2020-2025

	2020		2021		2022		2023		2024		2025	
Epidemiology	N*	%	N*	%	N*	%	N*	%	N*	%	N*	%
Incidence	32,415		33,232		34,085		34,910		35,713		36,538	
≥65 years	22,320	68.9	23,113	69.6	23,985	70.4	24,837	71.1	25,671	71.9	26,529	72.6
<65 years	10,095	31.1	10,119	30.4	10,100	29.6	10,073	28.9	10,042	28.1	10,009	27.4
Complete Prevalence	144,922		148,320		151,900		155,368		158,804		162,339	
≥65 years	99,172	68.4	102,549	69.1	106,272	70.0	109,921	70.7	113,520	71.5	117,243	72.2
<65 years	45,750	30.9	45,771	30.9	45,628	30.0	45,446	29.3	45,284	28.5	45,097	27.8

*N = number of patients

Results

It is estimated the number of unique prevalent patients will increase over time for each line (total of 13% across 5 years)

Table 2. Estimated number (N) of unique patients by LOT (1L–5L) for the USA in 2020 and 2025

Progression Free Survival by LOT			2020	2025
LOT	Mean (months)	95% CI of the Mean	N* (Min-Max) [†]	N* (Min-Max) [†]
First line	21	19–23	53,176 (47,304–59,212)	60,173 (53,505–67,035)
Second line	14	13–15	19,407 (15,935–23,273)	21,928 (18,002–26,302)
Third line	9	9–10	6,481 (5,143–8,877)	7,316 (5,806–10,023)
Fourth line	6	6–7	1,649 (1,146–2,667)	1,861 (1,293–3,010)
Fifth line	6	6–7	426 (217–876)	481 (245–989)

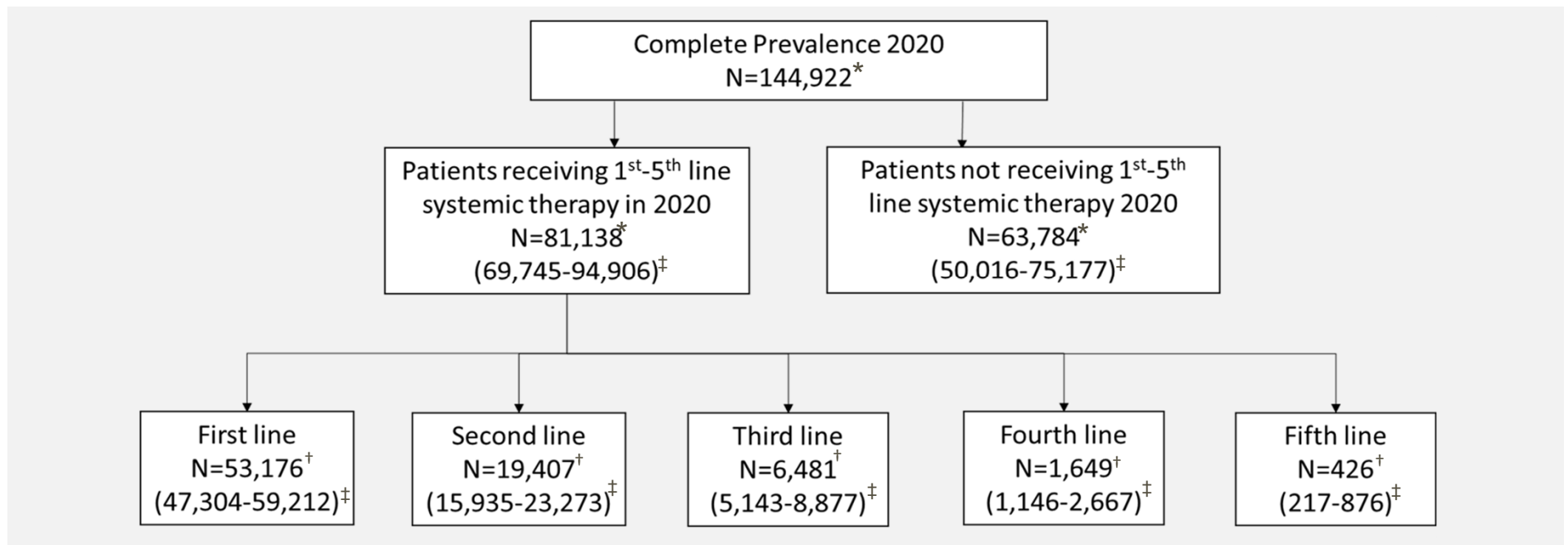
*N = number of patients initiating a LOT

[†]Minimum and maximum values using data for the 95% confidence interval around the mean proportion of patients initiating next line of therapy for each line of therapy



Results

Figure 1. Estimated projected total number (N) of unique patients from complete prevalence through LOT (1L–5L) for the USA in 2020



*N=number of patients

*†N=number of patients initiating a LOT

‡Minimum and maximum values using data for the 95% CI around the mean proportion of patients initiating next line of therapy for each line of therapy



Discussion & Conclusion

- Few published studies have reported on contemporary proportions of treated MM patients by LOT.
- The results of this study illustrate that incidence, prevalence and treatment by LOT for MM patients in the US are estimated to increase between 2020 and 2025.
- These results are aligned with others in the international literature.
- While several factors can contribute to the increase of MM incidence and treated patients projected into the future, one important factor is the underlying aging of the population with older age groups having higher incidence rates.
- Between 2020 and 2025, the total incidence as well as the total unique patients treated by line is projected to increase by 13% and this trend is expected to continue.
- More healthcare resources and more effective therapies for later line patients will be needed.

Study Limitations

- Possibility of recall bias by physicians.
- This study used historical results as a proxy for prevalence and treatment projections, it is possible that other factors not considered as a part of this project may influence the future incidence rates and treatment rates.



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