Exploring Key Sources of Social Determinants of Health and Their Impact on Survival in Multiple Myeloma Patients

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Introduction

•Multiple myeloma (MM) is a cancer that affects plasma cells, which are responsible for producing antibodies. It occurs when abnormal plasma cells accumulate in the bone marrow, leading to complications such as bone damage, anemia, kidney problems, weakened immune system, and hypercalcemia.[1]
•Over the past two decades, 5-year survival rates for multiple myeloma patients have notably increased. From 2000-2008, rates ranged from 34.5% to 49.6%[2]; rates increased starting 2012 and 2018, and surged to around 58% across all ages and stages[3]
•Considering social determinants of health (SDOH) factors in MM care is crucial for several reasons. MM has no known cure and is one of the most expensive forms of cancer patients can Develop.
•SDOH factors can make it more difficult for patients to access healthcare services. These disparities can lead to delays in diagnosis, suboptimal treatment outcomes, and disparities in survival rates. Additionally, socioeconomic factors can influence treatment decisions and adherence.[4]

Methods

•Performed comprehensive literature reviews of peer-reviewed articles sourced from reputable databases including PubMed and Google Scholar. These articles were specifically focused on patients diagnosed with MM. Utilized targeted keywords such as "Socio-Economic Status (SES)," "Affordability of Care," "e-Literacy," "Hematopoietic Stem Cell Disparities (HSCT)," "CAR-T disparities," "Comorbid Survivability," and "Racial Disparities" to ensure the relevance and specificity of the collected information.
Inclusion Criteria:
•Observational Cohort Studies (prospective or retrospective)
•Patients diagnosed with MM
•US Patients

References

1. National Comprehensive Cancer Network. (2022). NCCN Guidelines Version 3.2023: Multiple Myeloma. MS-2.
2. Howlader N, Noone AM, Krapcho M, Miller D, Bishop K, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2013, National Cancer Institute. Bethesda, MD, https://seer.cancer.gov/archive/csr/1975_2013/, based on November 2015 SEER data submission, posted to the SEER web site, April 2016.
3. SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute; 2023 Apr 19. [updated: 2023 Jun 8; cited 2023 Jul 3]. Available from: https://seer.cancer.gov/statistics-network/explorer/. Data source(s): SEER Incidence Data, November 2022 Submission (1975-2020), SEER 22 registries (excluding Illinois and Massachusetts). Expected Survival Life Tables by Socio-Economic Standards.
4. Chamoun, K., Firoozmand, A., Caimi, P., Fu, P., Cao, S., Otegbeye, F., Metheny, L., Patel, S., Gerson, S.L., Boughan, K., De Lima, M., & Malek, E. (2021). Socioeconomic Factors and Survival of Multiple Myeloma Patients. Cancers, 13(4), 590.

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Results

(# of Studies Included)	Insurance/SES (14)	Race-Ethnicity (14)	Comorbities/Health Lit. (9)	Age/HSCT (9)	CAR T Disparities (5)
Study Design:	Retrospective & Prospective	Retrospective & Prosective	Retrospective & Prosective	Retrospective	Prospective & Retrospective
Data Source:	SEER ,NCDB, Surveys	SEER ,EHR ,Claims, NCDB, CDB, Trials	Claims, SEER, EHR, Trials, Survey, NCDB	SEER, HER, Claims, NCDB, Survey	Trial, Claims, CDB,
Average Length of Studies:	4.9	9.3	5.1	4.6	4.6
Treatments:	Standard of Care	Standard of Care	Standard of Care	Standard of Care	CAR T
Statistical Significant Findings:	PTs treated at a higher volume facility had a 22% Lower risk of death (HR 0.87; 95% CI 0.75-0.87; P<.001). Median OS for Private Ins = 4.2 yrs, medicaid = 2.75yrs, None = 2.2 yrs	Black PTs were diagnosed 2-3 times higher rates than White Patietns (n=29,737; 11.0 vs 4.9; P<.001), but longterm OS was better	MM PTs w/ A.Fib had 1.2 higher OR of hospitalization (AOR = 1.16; 95% CI = 1.05-1.29) but no significant impact on OS.	Median OS= 2.74 yrs (n= 26,986). 96% of patients recieved HSCT <70 years. HSCT improved PFS 50 months vs 36 months and CR complete response (59% vs 48%) or MRD (79% vs 65%),	Large race/ethnicity differences captured by trials (1% Black, 5.4% Hispanic), additionally 1/3 of the group lived <2 hours away from treatment canter

Standard of Care = Immunomodulators (IMiDs), Protease Inhibitors (PIs) (or Cyclophosphamide), Dexamethasoneor Traditional Chemotheraputics) ± Immuntherapy (mabs)
PFS = Progression Free Survival
CR=complete response
MRD=minimal residual disease
A.Fib = Atrial Fibulation OR = Odds Ratio
AOR= Adjusted Odds Ratio
PTs=Patients

Individual Articles Summary

PDF of Poster

- Overall, 32 studies were included in this study, at least 5 studies were included for each Variable group.
- Studies Published between 2013-2023
- **Strengths**: Variety of Outcomes and measures, broad sample sizes, Various locations sampled, Compares both individual and multivariable studies, Variety of Data Sources, Overall Survival provides general results
- **Weakness**: Mainly retrospective studies, Selection Bias, Short Term studies (<2 years) not capturing long term safety/efficacy, only casual inferences can be made, more research required

Conclusions

- This comprehensive review characterizes observational studies exploring diverse SDOH factors impacting MM patient OS. Each factor has the potential to influence care differently, with varying outcomes. Identifying these gaps is the first step in improving patient care.
- The most influential SDOH factors were SES/Insurance, eligibility of HSCT, Race and ethnicity, and availability of CAR T. It is noteworthy that CAR T patients were driving over 120 miles on average to reach the treatment facility, adding to the overall cost of this treatment protocol. It is likely patients with lower SES or Insurance that does not provide the best coverage for CAR T treatments leading to even greater disparities in the MM treatment space.
- Patients of older age (75+) or Comorbidities and Health literacy showed mixed results, and little impact on OS for patients. Acquiring more data on these subjects is required before any significant inferences can be made. It is noteworthy that Commodities did indicate higher rates of hospitalization which may add to the financial burden on the patient.