

The Impact of Social Determinants of Health on the Prognosis of Patients with Malignant Pleural Mesothelioma.

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ABSTRACT

Background : Even with the best care and after taking into consideration individual comorbidities, patients with malignant pleural mesothelioma (MPM) still have a significant mortality risk. Our objective was to evaluate, using social determinants of health (SDH), the overall survival of patients with manageable MPM. We postulated that a patient's SDH score could with worse overall survival even under ideal conditions.

Methods : From 2004 to 2017, the National Cancer Database was retrospectively analyzed for this investigation. Included were adult patients with MPM in clinical stages I-IIIa. We created an SDH score index that categorizes patients of socioeconomic disadvantage by the following variables: income, education, geography, and hospital types within 250 miles, based on the personal and geographic features of the patients. Our survival analysis was conducted with the Kaplan-Meier approach in addition to the multivariable and univariate Cox regression models.

Results : Poorer results were indicated by higher composite SDH scores. The risk of mortality increased by 21% overall with increased disadvantage (hazard ratio [HR], 1.21; CI, 1.12-1.30), with score 2 showing a higher rise of 57% (HR, 1.57; CI, 1.36-1.81). Age, stage, comorbidities, multimodal therapy, hospital volume and kind, and so forth are taken into consideration by the SDH. The score index showed a 29% higher risk of death for score 2 when compared to £1 (HR, 1.29; CI, 1.10-1.50), and the index remained statistically

significant. Following correction for patients' SDH scores and other pertinent variables, the risk of death was reduced by 29% (HR, 0.71; CI, 0.62-0.81) following curative surgery and chemotherapy.

Conclusions : Survival results are influenced by a number of SDH parameters that are unrelated to patient characteristics or the type of treatment. Patients who are at risk for less than ideal survival outcomes due to socioeconomic disadvantages may be identified with the use of this SDH composite score.

INTRODUCTION

Following diagnosis, patients with malignant pleural mesothelioma (MPM) are at a significant risk of dying. The projected Five-Year Total In the US, the median survival time for MPM patients is now a pitiful 24 months, with substantially lower figures for advanced or metastatic disease.¹ These projections hold true even after receiving the best care possible, including multimodality therapy that includes advanced therapeutic procedures, radiation, and surgery. alternatives in addition to after taking varying comorbidities into consideration. Inequalities could result in less favorable results.^{2,3} To account for possible variations in results, a thorough analysis of the socioeconomic determinants of health (SDH) of the patients has not been conducted. Therefore, our goal was to evaluate functional MPM survival exclusively in light of sociodemographic and geographic variables. We postulated that, in the absence of ideal care, a patient's survival may be predicted by their specific SDH score.

INDIVIDUALS AND APPROACHES

Research design and results

In order to identify patients who are socioeconomically disadvantaged, we created a composite SDH score index using the following variables: patients' demographic and geographic factors hospital kinds within a 250-mile radius, income, education, and distance from cities. It was presumed that the patients were diagnosed and treated at the same Commission on Cancer location. Each risk factor was given one point based on a Cox regression model using item response analysis. Next, using data from the National Cancer Database (NCDB) for the years 2004 through 2017, we looked at how this composite score affected patients' overall survival with operable MPM.

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Data supplier

All information came from the NCDB, a collaborative effort between the American Cancer Society and the American College of Surgeons' Commission on Cancer. In this retrospective examination, society. The study was exempt from additional assessment since these data are taken from a deidentified NCDB file.

Analyze the population

The requirements for inclusion were a clinical stage I-IIIa MPM diagnosis and an age of eighteen years. Ages more than 75, histologic types other than epithelioid or biphasic tumors (Supplemental Table 1), mediastinal tumor extension, metastasis or stage IV disease, lack of survival or death date, and surgical contraindication prior to admission were therefore excluded criteria.

Analysis statistical

The R (4.2.2) software (R Foundation for Statistical Computing) was used to conduct the analysis. When presenting descriptive statistics, they typically take the form of medians with an range of the interquartile for continuous variables. To compare groups, the χ^2 and Wilcoxon rank sum tests were employed. Cox models, both multivariable and univariate, were utilized to estimate the primary outcome's factors.

The Variance Inflation Factor was utilized to evaluate the collinearity and multiple imputation of unknown values using regression trees and categorization. A $\alpha=0.05$ was used to determine significance, and P values less than 0.05 were regarded as statistically significant.

RESULTS

The characteristics of a patient: 1355 patients in all satisfied the inclusion requirements, and 56.7% (768/1355) of those patients had effective surgical therapy as a component of multimodal treatment (Supplemental Table 2). Individuals who underwent successful curative surgery also tended to be diagnosed in later years, have lower comorbidity indexes, and get care at academic and larger volume hospitals. Significantly, the baseline SDH score was likewise lower for these patients overall. Patient sex, primary residence location, distance from a metropolitan area, lower education level, and MPM histologic subtype did not vary statistically (Table 1).

Impact on survival is the primary outcome

At the last follow-up, there were 218 censored observations and 1137 fatalities overall. Considering the entire group, the At one year, the projected survival rates were 74% (72%–77%), and at five years, they were 19% (17%–21%). For this

cohort, the predicted median survival was 1.79 years, or 22 months. Patients with an SDH score of 1 had a longer survival at all time intervals when compared to those with a score of 2, with the largest absolute difference of 17% being observed for 1-year survival (Figure; Supplemental Table 3).

Mortality predictions

Supplemental Table 4 shows that each SDH variable contributed to higher mortality in a different way. Hazard ratio [HR], 1.13 [1.01–1.27], low income, and absence of The greatest factors influencing overall mortality (HR, 1.42 [1.06–1.91]) were distance from urban areas and community hospitals within 250 miles (HR, 1.34 [1.18–1.52]). The most significant factors affecting short-term (less than three months) survival were low income and education, while the most significant factor affecting long-term (more than three months) survival was being away from a city. Greater SDH category and higher risk were found to be independently correlated with SDH score with overall survival, according to univariable and multivariable analyses. Significant risk variables were being older, male, Black, and having Medicare or another type of government insurance. The receipt of curative surgery, epithelioid histology, and the year of diagnosis were significant protective factors (Table 2).

OBSERVATION

Our findings confirmed previous study indicating that obtaining curative surgical resection is a critical component in enhancing patients' overall survival who have manageable metastatic prostate cancer. We discovered that surgical treatment itself was linked to improved patient survival at all timepoints in our study, and that curative surgery functioned as an independent factor in extending overall survival (HR, 0.72). examination. Prior research has indicated that insurance status and kind of facility may have an impact on the patients who receive effective surgical therapy, meeting national standards for the management of manageable MPM.3. In line with our prediction, we discovered a strong correlation between sociodemographic characteristics and death, which is most likely unrelated to patient-to-patient biologic variations or the therapies administered. Furthermore, we discovered that Black racial background, growing age, and male sex were all significant predictors of death. Similar results on female sex and age acting as protective factors against death have been documented.4 Although growing older is a recognized risk factor for death from a number of malignant neoplasms, the causes of this is unknown if there is a gender difference in the overall survival of patients with operable MPM.5. According to our data, Black race can predict death. which runs counter to an earlier NCDB study on this gap. Six More in-depth investigation into any causal or correlational pathways is still

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being conducted. Our analysis is unusual since it uses a special SDH score that accounts for nonclinical and nonbiologic (i.e., less significant at the individual level) factors and how they affect survival. As previously demonstrated, we discovered multiple factors that contribute to survival disparities for patients with operable MPM because of socioeconomic and geographic SDH. For patients with the lowest overall score, a substantial decrease in overall survival (HR, 1.21) was anticipated. Income, level of education, or distance from cities as shown by the facility's largest distance and the absence of a secondary hospital within 250 miles. Moreover, the greatest contributors to overall mortality were poor poverty (HR, 1.13) and the absence of community hospitals within 250 miles (HR, 1.34). Although there hasn't been a report of an SDH score to yet, comparable correlations have been found when analyzing sociodemographic indices like total fertility rate, per capita income, and educational attainment.⁷ Furthermore, prior research has also shown how these findings connect to wealth and geography.^{8, 9} Still, considering The identification of independent impacts from education and income levels, despite the fact that these SDH characteristics are frequently coupled, is another strength of our analysis. Furthermore, a number of solid tumor forms, including mesothelioma and non-small cell lung cancer, were linked to higher mortality rates in rural locations.¹⁰ The absence of external validation and potential patient exclusion are two significant limitations of our analysis. Who, due to social disadvantage restricting referral or a change in accreditation status, are not treated at centers evaluated by the NCDB. Moreover, NCDB does not keep track of patients across different facilities, and it's feasible that patients will visit one facility for cytoreductive surgery treatment but obtain systemic therapy or a diagnosis there. In summary, nonclinical and nonbiologic SDH independently affect survival, even while surgical treatment of patients with operable MPM lowers mortality. Our examination is beneficial. Explain the possible connection between SDH and reduced access to multimodality therapy. In order to enhance overall survival and equity in outcomes for this complicated disease, we expect that our exploratory SDH score can assist doctors in real time in identifying which patients require the closest follow-up and assistance.

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