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Keeping it in the family: the impact of marital status and next of kin on cancer treatment and survival

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Abstract

BACKGROUND: This study examines the impact of marriage and next of kin identity on timing of diagnosis, treatment, and survival in cancer patients.

METHODS: Retrospective review of patients with 5 solid tumor types treated at an academic medical center from 2002 to 2012. Exposures of interest were marriage status at time of diagnosis and familial relationship with next of kin (NOK). Association with overall survival determined via Cox regressions and with early diagnosis (stage I to II) and receipt of surgery via logistic regressions.

RESULTS: Marriage was not associated with early diagnosis for any cancer type. After adjustment, being married was associated with significantly higher odds of receiving surgery only for pancreatic cancer and with improved survival for breast and lung cancers. Having a nuclear relationship with NOK was not associated with any outcomes.

CONCLUSIONS: Marriage status was associated with improved outcomes for certain cancers whereas familial relationship with NOK was not.

Social support is a well-established predictor of health. Individuals lacking social support are at increased risk for cardiovascular disease, poor prognosis after myocardial infarction, worse functional recovery after stroke, and increased mortality in general.[1–7] Social support may also influence surgical outcomes. Patients with less support tend to stay in the hospital longer postoperatively, have worse postoperative functional recovery, and have increased surgical mortality.[8–10]

Familial relationships are potential indicators of social support. In particular, the role of marriage in survival among patients diagnosed with cancer remains unclear. Although some have found that marriage reduces the risk of cancer mortality, others report mixed or nonsignificant results.[11–14] Additional, more innovative measures of social

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support are also needed. Although widely documented in hospital records, the relationship of a patient to his/her next of kin (NOK) has never before been investigated as a possible proxy for familial social support.

Despite the technological advances and globalization of the 21st century, social isolation is increasing due to factors such as decreased intergenerational living, increased age-related disability, and delayed marriage.[15,16] Understanding patient-level predictors of poor social support is essential in designing targeted interventions to reduce health disparities in these populations. The aim of this study is to determine the association of marriage status and NOK identity with cancer outcomes, including early stage at diagnosis, likelihood of receiving surgery, and overall survival in patients with solid tumors.

Methods

Population

We performed a retrospective review of adult patients receiving treatment for cancer at our tertiary care, academic medical center between January 1, 2002 and December 31, 2012. Patients with the 5 most common solid tumors at our institution were included in the study population: breast, lung and bronchus, colon and rectum, kidney, and pancreas. Patients with only 1 type of invasive (non in situ) cancer diagnosed during the study period who received at least part of their treatment at our institution were included. Patients with missing cancer stage or surgery status were excluded, as were patients with missing marital status at time of diagnosis (2,471 total). Transgender patients were categorized with the gender with which they identified at time of diagnosis.

Exposure and outcomes

We used marriage status and relationship with NOK as proxies for social support within a family. Patients who were married (either via common law or domestic partnership) were categorized as married and patients who were single, widowed, separated, or divorced as unmarried. NOK identity was grouped into nuclear family (parent, child, or sibling) and non-nuclear NOK (other relative, unrelated, or no NOK.) Stage was considered early if I to II. The primary outcome of interest was overall survival, and secondary outcomes were diagnosis at early stage and receipt of surgery.

Data collection

Demographics (including marriage status), treatment, and survival information were obtained from existing tumor registry data. Patients without documented chemotherapy, radiotherapy, immunotherapy, or hormone therapy were assumed not to have received it. Demographic and marriage status variables refer to the patient's status at the time of diagnosis. Patient electronic charts were reviewed to extract NOK information. Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at Beth Israel Deaconess Medical Center. REDCap is a secure, web-based application designed to support data capture for research studies, providing an intuitive interface for validated data entry, audit trails, and automated export procedures for data downloads to statistical packages.[17]

Statistical analysis

Analysis was performed separately for each individual cancer. Categorical patient and treatment characteristics were compared between married and unmarried and patients with nuclear NOK vs non-nuclear via chi-square. Univariate and multivariate logistic regression models were created for odds of early diagnosis and receipt of surgery. Early diagnosis models were adjusted for sex, age, insurance status, and race, and surgery models for sex, age, insurance status, race, and early stage at diagnosis. Univariate survival analysis was performed using Kaplan-Meier curves and log-rank tests. Cox proportional hazard regressions were used to perform time-to-event analyses from date of diagnosis to date of death (from any cause) or censoring. Proportional hazards were tested for covariates likely to influence overall survival (marriage or NOK, age, insurance category, receipt of surgery, and receipt of chemotherapy or radiotherapy.) Receipt of immunotherapy and hormone therapy was also adjusted for in breast and kidney cancer. Those covariates that met proportional hazards assumptions were placed in the model, and we stratified by the covariates in which proportional hazards were violated. Cox models for pancreatic cancer were censored at 36 months, and NOK analysis was performed in 2 subsets (patients who survived less than or equal to 2 months and those who survived more) to meet proportional hazards assumptions. Sex was not included in the breast cancer models due to the low numbers of male patients. Follow-up for survival was at least 1 year for all patients.

In the breast cancer cohort, we performed a sensitivity analysis with further adjustment for distance traveled and median income by zip code. Distance traveled refers to driving distance measured between the patient's home zip code and the hospital's zip code using Maptitude 2015 (Caliper Corporation, Newton, MA), a Windows-based geographic information system. Median income by zip code was obtained from 2012 US census data.[18] Each continuous variable was changed into a binary variable based on the population median (10.5 miles for distance and $79,429 for median income by zip code). The cohort for the sensitivity analysis consisted of 3,176 breast cancer patients, after excluding 108 patients with unknown income or distance and 23 outliers who traveled greater than 300 miles, who were felt to be different from the rest of the group.