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Disparities in disease presentation in the four screenable cancers according to health insurance status

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ABSTRACT

Objectives: Current guidelines support the use of screening for early detection in breast, prostate, colorectal and cervical cancer. The purpose of this study was to evaluate whether insurance status predicts for more advanced disease in these four currently screened cancers.

Study design: The Surveillance, Epidemiology, and End Results (SEER) database was queried for breast, prostate, colorectal and cervix in patients aged 18–64 years. The database was queried from 2007 to 2011, with 425,614 patients with known insurance status included.

Methods: Multinomial logistic regression was used to evaluate insurance status and cancer presentation.

Results: Under multivariate analysis for breast cancer, uninsured patients more often had invasive disease (odds ratio [OR]: 1.55), T- (OR: 2.00), N- (OR: 1.59) stage, and metastatic disease (OR: 3.48), and were more often high-grade (OR: 1.21). For prostate cancer, uninsured patients again presented more commonly with higher T-stage (OR: 1.45), nodal (OR: 2.90) and metastatic (OR: 4.98) disease, in addition to higher prostate-specific antigen (OR: 2.85) and Gleason score (OR: 1.65). Colorectal cancer had similar findings with uninsured individuals presenting with more invasive disease (OR: 1.78), higher T (OR: 1.86), N (OR: 1.22), and M (OR: 1.58) stage, in addition to higher carcinoembryonic antigen levels (OR: 1.66). Similar results were seen for cervical cancer with uninsured having higher T (OR: 2.03), N (OR: 1.21), and M (OR: 1.45) stage.

Conclusion: In the four cancers detected by screening exams, those without health insurance present with more advanced disease, with higher stage and grade, and more elevated tumour markers.

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Introduction

More than 45 million individuals in the USA are uninsured and face physical, emotional and financial barriers to receiving proper care, leading to increased morbidity and mortality.[1] Cancer is currently the second leading cause of death with 1,658,370 new cancer cases and 589,430 cancer deaths expected in 2015.[2] Overall, the combined cancer death rate has been declining in the last several decades, much of it due to earlier detection and better upfront and salvage treatment options. Nevertheless, health care disparities continue to play a large role in cancer-related outcomes, and as a result, not all parts of the American population share in this overall decline in cancer mortality. Racial and ethnic minorities, for example, are disproportionally uninsured, with 13% of whites uninsured compared to 32% of Hispanics, 21% of African Americans, and 27% of Native Americans/Alaskans.[3] In addition, cancer patients who have a lower socio-economic status are often either uninsured or have poor access to health care, thereby leading to a more advanced disease presentation with a lower frequency of receiving access to definitive treatment including surgery, radiation and chemotherapy.

Several studies thus far have demonstrated a strong correlation between insurance status and rates of cancer screening, showing uninsured or underinsured are less likely to undergo recommended cancer screening.[4,5] For example, one study found insured patients when compared to uninsured were more likely to receive physician recommendations for colorectal screening and were therefore more likely to undergo recommended testing.[6] Another study evaluated the utilisation of mammography, clinical breast exams, and Papanicolaou (Pap) smear screening and found lack of health insurance coverage to be the strongest independent predictor for low utilisation of these recommended screening tests.[7]

It is well-known that cancer screening and early detection leads to improved survival. Given the importance of screening in early cancer detection and multiple studies demonstrating the association between insurance status and rates of screening, the purpose of this population-based study was to evaluate whether insurance status predicts for more advanced disease, specifically analysing rates of invasive disease, higher stage, higher grade, and more elevated tumour markers in the four currently screened cancers.

Methods

The NCI-sponsored SEER database including 18 registries was queried using SEER*Stat-v8.1.5 (seer.cancer.gov). A total of 453,173 patients, aged 18–64 years, who were diagnosed with breast, prostate, colorectal, and cervix cancer between January 1, 2007 and December 31, 2011 were initially queried from the database. Patients initially selected had a site code consistent with the four selected cancers using the International Classification of Disease for Oncology (third edition). For inclusion, complete data on survival were required. All patients had known insurance status; those with unknown status were excluded ($n = 27,559$). A sensitivity analysis was performed on patients with unknown insurance status prior to exclusion with no significant difference in results. Patients 65 years or older were also excluded as this was the age that most patients are eligible for Medicare, which presently is not clearly recorded for patients as per the current SEER coding guidelines. Males with breast cancer were excluded as men are not commonly screened for breast cancer.

Patient demographics and treatment variables

Patient variables included age, gender, race, marital status, residence, insurance status, percent of county below poverty, tumour stage, nodal stage, metastasis, disease stage using SEER definitions prostate-specific antigen (PSA) levels (continuous) and Gleason score (GS) for prostate cancer, tumour grade in breast cancer, and use of radiation. Marital status included common-law marriages; single included divorced and widowed. Residence included urban and rural. Urban was defined as big metropolitan, metropolitan or urban adjacent to metropolitan, using SEER definitions. Insurance status was defined as insured (including non-Medicaid, no specifics), Medicaid coverage (any Medicaid) and uninsured. Insured designation included private insurance (fee-for-service, managed care, HMO, PPO, TRICARE), Medicare and military coverage at the time of initial diagnosis and treatment. Percent of county below poverty was taken from the Census 2007–2011 American Cancer Society data. Stage was based on the American Joint Committee on Cancer staging atlas (AJCC 6th edition). Extent of disease by SEER definition was based on TNM staging and recorded as *in-situ*, localised, regional and distant. For breast and colorectal, *in-situ* was compared to localised, regional and distant; for prostate and cervix where *in-situ* data were not available, localised was compared to regional/distant.

Statistical analysis

All statistical analyses were performed using SPSS V22.0 (SPSS Inc., Chicago, IL). Pearson's chi-squared tests were used to assess associations between insurance and disease presentation. Variables were chosen *a priori*. Multivariate logistic regression models were used to assess the association between insurance status and cancer presentation. Separate models were constructed for each disease site considered. Additional covariates in the models were age, race, percent of county below poverty, marital status, and residence. Gender was included as a covariate only in colorectal cancer, as the other cancers are gender-specific.

Results

Table 1 lists the baseline characteristics of the 425,614 patients included in the analysis. Total patient numbers by site are follows: breast ($n = 214,330$), prostate ($n = 117,029$), colorectal ($n = 80,966$), and cervix ($n = 13,289$). Of the entire cohort, the majority were non-Medicaid insured ($n = 365,620$; 85.9%), followed by Medicaid ($n = 44,848$; 10.5%), and uninsured ($n = 15,146$; 3.6%). By subsite, the majority of patients were white, married, living in urban communities, and presented