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Geographic disparities in adherence to adjuvant endocrine therapy in Appalachian women with breast cancer

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Abstract

Background: Appalachia is a largely rural, mountainous, poor and underserved region of the United States. Adherence to adjuvant endocrine therapy among Appalachian women with breast cancer is suboptimal.
Objectives: To explore small-area geographic variations and clustering patterns of breast cancer patient adherence to adjuvant endocrine therapy and associated factors in Appalachia.
Methods: In this retrospective study, we analyzed Medicare claims data linked with cancer registries from four Appalachian states (PA, OH, KY, and NC) in 2006–2008. We included adult women who were diagnosed with stage I–III, hormone-receptor positive, primary breast cancer and who newly started adjuvant endocrine therapy after the primary treatment for breast cancer. Hot spot analysis was conducted to explore geographic variations in adjuvant endocrine therapy adherence. Geographically weighted logistic regression (GWLR) was used to examine whether the impacts of factors associated with adherence varied across the region.
Results: Breast cancer patients living in PA and OH showed higher adherence to adjuvant endocrine therapy than those living in KY and NC. We identified clusters of high adherence in most of PA but poor adherence in Erie County, PA and in Buncombe, Transylvania, Henderson, and Polk Counties, NC. Adherence to adjuvant endocrine therapy was significantly associated with the Health Professional Shortage Area designation, catastrophic coverage, dual-eligibility status of Medicaid and Medicare, adjuvant endocrine therapy drug class, and side effects. And among these factors, the impacts of dual-eligibility status and the use of pain medications to treat side effects on adherence were more pronounced in KY and NC than in PA.
Conclusions: There were significant geographic disparities in adherence to adjuvant endocrine therapy in the Appalachian counties in PA, OH, KY, and NC. This study explored these geographic areas with poor

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adherence as well as geographically varying effects of predictors on adherence; our results may provide more localized information that may be used to improve adjuvant therapy use and breast cancer care in these high-risk and underserved areas.

Keywords: Appalachia; Breast cancer; Adjuvant endocrine therapy; Adherence; Geographically weighted regression

Introduction

Adjuvant endocrine therapy (AET) is an important treatment modality for hormone-receptor (HR) positive breast cancer due to its significant benefits in reducing recurrence and mortality.[1–4] To achieve the optimal clinical benefits, adherence to AET is crucial.[5–7] The current literature has identified many individual characteristics that may be inversely related to AET adherence such as extreme age (younger [under 40–45 years old] or older [over 75–85 years old]), higher out-of-pocket drug costs, switching drugs, drug class (aromatase inhibitors vs. tamoxifen), suboptimal patient-centered communication, lack of perceived self-efficacy in patient–physician interaction, and adverse drug reactions,[5,8–11] but the literature has paid limited attention to geography or associated factors. In fact, geography can serve as a proxy or composite measure for various observed and unobserved variables that may be related to medication adherence, such as access to care, available health resources, socioeconomic status, disease burden, race/ethnicity, and culture.[12] Examining geography and associated factors may help advance AET adherence research by further explaining individual variations in AET adherence that cannot be fully explained by individual characteristics. Small-area geographic variations in medication adherence may be attributable to the neighborhood effect, which describes the social interactions impacting an individual's behavior or outcomes.[13] Theoretically, people residing in the same neighborhood are more likely to share common social norms, cultural background, socioeconomic status, and systemic and lifestyle characteristics compared to people living in different neighborhoods, which may further shape health behaviors, including medication-taking behaviors, above the individual-level.[14] There may also be provider neighborhood effects, such as possible ineffective or inadequate patient-provider communication in the Health Professional Shortage Area (HPSA) that leads to the failure to underscore the importance of AET adherence, or similar prescribing or practice behaviors under the influence of similar policies, regulations or interventions in one area.

The Appalachian region of the United States (US) covers 204,452 square miles in 420 counties along the spine of the Appalachian Mountains.[15] This region contains all of West Virginia, and portions of 12 other states: New York, Pennsylvania, Ohio, Maryland, Kentucky, Virginia, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Mississippi. The Appalachian population in the US is a special population of interest in cancer research because it consistently suffers from a significant cancer burden, with higher cancer incidence and mortality than the non-Appalachian population.[16,17] In terms of breast cancer, compared to other regions, Appalachia experienced a slower decline in breast cancer mortality,[18] and its patients receive guideline-recommended breast cancer screening and primary treatment at lower rates than those in other regions.[19–21] The factors leading to poor access to and utilization of care in this region may include rural residence, geographic isolation, lack of public transportation, underdeveloped telecommunication infrastructure, high poverty and unemployment rates, inadequate medical resources, a shortage of healthcare professionals, lower levels of educational attainment, and attitudinal and cultural factors.[20,22,23] Given the largely rural, mountainous environment and unsatisfactory patient adherence to AET in Appalachia as a whole,[5] we need to measure geographic variations in AET adherence beyond the general urban and rural classification. The identification of "hot spots" that require monitoring and intervention can help local communities to develop strategies to improve cancer treatment use and outcomes. However, there have been very few studies examining geographic disparities in adjuvant cancer treatment use in this region, primarily due to the lack of data and of a representative study sample. Therefore, we pursued the following study aims: