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The impact of nativity on cervical cancer survival in the public hospital system of Queens, New York

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HIGHLIGHTS

- An immigrant health paradox existed for cervical cancer patients.
- Marked survival differences based on nativity existed for cervical cancer patients.
- Improved survival was demonstrated for foreign-born Latino and Asian patients.

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ABSTRACT

Objective. We studied cervical cancer patients who presented to the Public Hospital System in ethnically-diverse Queens, New York from 2000 to 2010 with the purpose of examining the relationship between nativity (birthplace) and survival.

Methods. A retrospective review of tumor registries was used to identify patients diagnosed with cervical cancer between January 1, 2000 and December 31, 2010. Using electronic medical records, data from 317 patients were available for this analysis.

Results. The majority of patients were born outside the United States (US) (85.5% versus 14.5%). One hundred patients (31.5%) were born in Latin America, 105 in the Caribbean Islands (33.1%), 48 in Asia (15.1%), 8 in the South Asia (2.5%), 10 in Russia/Eastern Europe (3.2%) and 46 (14.5%) in the United States. Patients presented at varying stages of disease: 51.4% at stage I, 19.6% at stage II, 19.6% at stage III, and 8.5% at stage IV. Kaplan-Meier estimated survival curves stratified by birthplace demonstrated significant differences in survival distributions among the groups using the log-rank test ($P < 0.0001$). The most favorable survival curves were observed among patients born in Latin America and Asia whereas the least favorable was demonstrated in US-born patients. Time to death was analyzed using the Cox proportional hazards model. Adjusting for age at diagnosis, insurance status, stage and treatment modality, nodal metastases and hydronephrosis, birthplace was significantly associated with survival time ($P < 0.0001$).

Conclusion. An immigrant health paradox was defined for foreign-born Latino and Asian patients presenting with cervical cancer to the Public Hospital System of Queens, New York as patients born in Latin America and Asia were less likely to die at any given time compared to those born in the United States.

1. Introduction

Cervical cancer is the fourth most common cancer in women worldwide behind breast, colorectal and lung cancer with 527,600 new cases

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and 266,000 deaths attributed to the disease annually based on the GLOBOCAN 2012 data of the International Agency for Research on Cancer [1,2]. Approximately 85% of all new cervical cancer cases and cervical cancer deaths occur in developing countries [2]. Regions of the world with the greatest burden of disease include Latin America, the Caribbean Islands, sub-Saharan Africa and parts of Asia [3]. In comparison, 12,820 new cases and 4210 deaths from cervical cancer are estimated for 2017 in the United States [4].

The patient population of the Public Hospital System of Queens New York, comprising two hospitals, is unique because it treats, for the most part, foreign-born women from throughout the world. At Elmhurst Hospital Center, the top five countries of birth are: Ecuador, Mexico, Columbia, Dominican Republic and Bangladesh. In contrast, at Queens Hospital Center, the top five countries of birth include: Guyana, Jamaica, Bangladesh, Trinidad and Tobago, and Haiti.

The gynecologic oncology literature is replete with studies addressing racial and ethnic differences in diagnosis, treatment and survival among patients with primary cervical cancer [5–14]. However, these studies have compared survival among women of different ethnic groups treated in the United States without regard to nativity. Significant disparities in cancer incidence and mortality rates have been demonstrated among minority groups in the United States despite overall declines in these rates for the population as a whole [5]. Few investigators have studied cervical cancer specifically in foreign-born women living in the United States [3,14–16]. Each of these studies utilized National or Statewide Cancer Registries to investigate disparities in outcome of cervical cancer patients. Furthermore, two of the studies limited their study population to Hispanic women [15,16] whereas one study addressed foreign-born Hispanics and Asians [14] and another, foreign-born women without further classification of their geographic area of birth [3].

Given the large and diverse patient population of Queens, New York, we addressed the study question: Are there nativity differentials in survival among patients treated at the Public Hospital System of Queens New York? We also examined selected demographic, medical, social factors as well as Pap smear screening data, tumor characteristics and treatment data by nativity among US-born and foreign-born patients. The purpose of this review is to provide exploratory data to help direct screening strategies for immigrant populations and to better understand the diverse populations presenting for care at all our major public institutions.

2. Methods

Institutional review board approval was obtained for this retrospective study. All patients diagnosed with cervical cancer from January 1, 2000 to December 31, 2010 were identified by querying the Cancer registries of Elmhurst (ERS) and Queens Hospital (METRIQ) Centers, Queens, New York. Three hundred twenty-two (322) patients were diagnosed with cervical cancer during the study period. The place of birth was obtained for all patients in the study population. Five patients were excluded (one from South Africa, two from West Africa and two from the Middle East), because their birth places did not fit in any of the 6 common birth place categories (United States, Latin America, Caribbean Islands, Asia, South Asia and Russia/Eastern European) and there were too few patients to create new categories.

Demographic data including race, place of birth and insurance status at the time of cancer diagnosis was collected. Medical and social history data including the presence of hypertension and diabetes and alcohol and tobacco use was ascertained. Pap smear data was obtained exclusively from the electronic medical record of our Hospital System and no pap smear data was obtained from the patient's country of birth. The International Federation of Gynecology and Obstetrics (FIGO) clinical stage and pathology data (histology, tumor grade, presence of lympho-vascular space invasion and tumor size) were collected. In addition, the presence of hydronephrosis and nodal disease on presentation was noted for each patient. Information regarding the primary treatment and vital status were also collected.

All tumor registry data was confirmed by reviewing the electronic medical record, QUADRAMED, that was used at both hospitals. The computer tomographic scan and PET scan reports of each patient at presentation were reviewed. The paper medical record, when available, was used to obtain data missing from the electronic medical record.

The surgical therapy for stage I cancers included extra-fascial hysterectomy and modified radical and radical hysterectomy with pelvic lymphadenectomy. Radiotherapy consisted of whole pelvic radiotherapy of 4500 to 5040 cGy. Low Dose Rate brachytherapy was used from January 1, 2000 to February 2003. Afterwards, patients received High Dose Rate brachytherapy at a dose of 900 cGy/fraction × 2 applications or 750 cGy/fraction × 3 applications.

Concurrent chemotherapy with radiotherapy at Elmhurst Hospital Center from January 2000 to February 2003, was administered during three in-patient admissions at a dose of 75 mg/m^2 and afterwards at a dose of 40 mg/m^2 on a weekly during radiation therapy. All concurrent chemotherapy administered at Queens Hospital Center was given at a dose of 40 mg/m^2 weekly as an outpatient.

Place of birth was categorized into 6 groups: United States, Latin America, Caribbean Islands, South Asia, Asia, and Russia/Eastern Europe. Patients born in Guyana were included in the Caribbean category. Clinical stage was collapsed into Stage I, II, III and IV. Treatment was categorized into: Excisional, Hysterectomy, Hysterectomy and Adjuvant Radiation Therapy, Radiation Therapy, Chemo-radiation Therapy and Chemotherapy alone.

Demographics, medical history and tumor characteristics were compared across nativity groups using chi-square, ANOVA and Kruskal-Wallis tests as appropriate. Overall survival distributions were estimated using the Kaplan-Meier method and compared across nativity groups using the log rank test. The association between nativity and survival was also assessed after adjusting for age at diagnosis, insurance status, clinical stage, nodal disease and hydronephrosis using a Cox proportional hazards model. Time to death was modeled using a Cox proportional hazards model. All analyses were conducted using SAS version 9.4 (SAS Institute, Cary, North Carolina).

3. Results

3.1. Demographic, behavioral and social factors (Table 1 and Table S1)

There was a total of 317 patients available for study (Table 1 and Table S1). The highest percentage of patients were born in the Caribbean Islands 33.1% (105 patients) and in Latin America 31.5% (100 patients). Similar percentages of patients were born in the United States (14.5%) and in Asia (15.1%). A minority of patients were born in the South Asia (2.5%) and in Russia and Eastern Europe (3.2%). The majority of Latin American patients were born in Columbia (26%) and Ecuador (23%). Additionally, 10% were born in Mexico, 9% in Honduras and 7% in El Salvador, Guatemala and Peru. Most Asian patients were born in China (36%), Korea (30%) and the Philippines (23%) (Table S1).

In the overall sample, the median follow-up time was 69.2 months with an inner quartile range of 28.7 to 110.6 months.

The mean age at diagnosis of the study population was 52 years. Patients born in Latin America were the youngest with a mean age of 49 years whereas those born in the Caribbean Islands were the oldest with a mean age of 55.2 years. Patients born in the United States had a mean age of 52.4 years. There was significant variation in age of diagnosis demonstrated among nativity groups ($P = 0.04$).

Overall 13% of patients admitted to smoking and 13% to the use of alcohol. The majority of patients who responded positively to either smoking or alcohol use were born in the Unities States.

One hundred and ninety patients (59.9%) were uninsured at the time of their primary diagnosis of cervical cancer. Of the 46 US-born patients, however, the majority (78.3%) were insured. Among the other