

Disparities in Radiation Oncology

The pervasive crisis of diminishing radiation therapy access for vulnerable populations in the United States—part 3: Hispanic-American patients

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Abstract

Purpose: Health disparities have profoundly affected underrepresented minorities throughout the United States, particularly with regard to access to evidence-based interventions such as surgery or medication. The degree of disparity in access to radiation therapy (RT) for Hispanic-American patients with cancer has not been previously examined in an extensive manner.

Methods and materials: An extensive literature search was performed using the PubMed database to examine studies investigating disparities in RT access for Hispanic-Americans.

Results: A total of 34 studies were found, spanning 10 organ systems. Disparities in access to RT for Hispanic-Americans were most prominently studied in cancers of the breast (15 studies), prostate (4 studies), head and neck (4 studies), and gynecologic system (3 studies). Disparities in RT access for Hispanic-Americans were prevalent regardless of the organ system studied and were compounded by limited English proficiency and/or birth outside of the United States. A total of 26 of 34 studies (77%) involved analysis of a population-based database, such as Surveillance, Epidemiology and End Result (15 studies); Surveillance, Epidemiology and End Result-Medicare (4 studies); National Cancer Database (3 studies); or a state tumor registry (4 studies).

Conclusions: Hispanic-Americans in the United States have diminished RT access compared with Caucasian patients but are less likely to experience concomitant disparities in mortality than other underrepresented minorities that experience similar disparities (ie, African-Americans). Hispanic-Americans who are born outside of the United States and/or have limited English proficiency may be more likely to experience substandard RT access. These results underscore the importance of finding nationwide solutions to address such inequalities that hinder Hispanic-Americans and other underrepresented minorities throughout the United States.

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Introduction

Health care disparities result in significant suffering, often with deadly consequences, in the treatment of cancer. To better elucidate the disparities that vulnerable populations

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in the United States face, the current *Advances in Radiation Oncology* series has investigated radiation therapy (RT) access disparities that African-Americans and Native Americans face.¹⁻³ In this review, we turn our attention to the Hispanic-American population and the barriers they face in receiving RT care.

As recently as 2014, 17% of Americans (55 million) identified themselves as Hispanic or Latino. Cancer accounts for 22% of deaths, making it the number one cause of death in Hispanic-Americans.⁴ Not including carcinoma in situ, basal cell, and squamous cell skin cancers (which are not required to be reported to cancer registries), approximately 58,400 and 67,500 new cancer cases were expected to be diagnosed in Hispanic men and women, respectively, in 2015.⁵ Approximately 1 in 3 Hispanic-Americans will be diagnosed with cancer during their lifetime. The probability of dying from cancer is 20% for Hispanic-American men and 17% for Hispanic-American women.⁵

The most commonly diagnosed forms of cancer among Hispanic-American men are prostate (22%), colorectal (11%), lung (9%), kidney (7%), and liver (6%); for Hispanic women, they are breast (29%), thyroid (9%), colorectal (8%), uterine (8%), and lung (7%).⁵ Because the Hispanic-American population is younger than the Caucasian population, a larger proportion of cancers are diagnosed in younger age groups; only 12% of Caucasians under the age of 50 years are diagnosed with cancer, but this number is more than double for Hispanic-Americans (25%).⁵

Given the indispensable role of RT in optimal cancer care, any disparity in RT access will disproportionately impair Hispanic-American patients' life expectancy, particularly given the larger proportion of Hispanic-Americans diagnosed with cancer before the age of 50 years. To accurately assess the literature with regard to RT access disparities for Hispanic-American patients, a comprehensive search of the PubMed database (<https://www.ncbi.nlm.nih.gov/pubmed>) was performed for articles up to and including April 22, 2017, using the search terms "Hispanic," "radiotherapy," and "disparities" in concert. The search revealed 41 articles, the earliest being published in 2005; of these, 34 investigated Hispanic-American RT access (Table 1).

Results

Most common cancers in Hispanic-Americans (breast, prostate, lung, colorectal, gynecologic)

Breast cancer

Similar to the findings for African-American RT access, breast cancer was by far the most common cancer type examined in Hispanic-American RT access disparities; the 15 breast cancer studies comprised more than 40% of the 34 total studies.^{2,6-20} Twelve of these 15 studies (80%) used a population-based database (National Cancer Database

Table 1 Hispanic-American radiation therapy disparity studies

Cancer type	Number of studies	Population-based data source*
Breast ⁶⁻²⁰	15	12 of 15
Prostate ²¹⁻²⁴	4	3 of 4
Lung ²⁵	1	0 of 1
Colorectal ^{26,27}	2	1 of 2
Gynecologic ²⁸⁻³⁰	3	3 of 3
Head and Neck ³¹⁻³⁴	4	2 of 4
Sarcoma ^{35,36}	2	2 of 2
Lymphoma ³⁷	1	1 of 1
Central nervous system ³⁸	1	1 of 1
Pancreas ³⁹	1	1 of 1
Total	34	26 of 34 (76.5%)

* Surveillance, Epidemiology and End Result = 15 studies; Surveillance, Epidemiology and End Result-Medicare = 4 studies; National Cancer Database = 3 studies; state tumor registry = 4 studies; other (ie, survey-based, single-institution databases) = 8 studies.

[NCDB]; Surveillance, Epidemiology and End Result [SEER]; or a state tumor registry) for retrospective analysis (Table 1).

The earliest study used a Florida statewide registry to assess 18,903 patients with local breast carcinoma to determine the impact of distance to RT facilities on the likelihood of receiving breast-conserving surgery (BCS) + RT. The study found that Hispanic-American patients were 38% less likely than Caucasian patients to receive BCS + RT.⁶ A subsequent study used a tracking-and-feedback registry involving 6 New York City hospitals (939 women with newly diagnosed stage I-II breast cancer who had undergone surgery—639 before the registry, 300 after registry implementation) in an attempt to reduce racial disparities in breast cancer care by closing the referral loop between surgeons and oncologists.⁷ The authors found that implementation of the registry significantly reduced underuse of adjuvant treatment (defined as no RT after BCS, no chemotherapy for estrogen receptor–negative tumors, or no hormonal therapy for estrogen receptor–positive tumors ≥ 1 cm) in Hispanic-Americans from 23% to 13%, compared with 17% to 14% in Caucasians.⁷ The reduction was significant enough among Hispanic-Americans and African-Americans after registry implementation to make minority race no longer a risk factor for underuse of adjuvant therapy or low rates of oncology consultation.⁷

The next study used SEER to evaluate 375,547 adult women with stage I-II breast cancer diagnosed over a 17-year period to assess receipt of definitive local therapy (either mastectomy or BCS + RT), and found that Hispanic-Americans were significantly less likely to receive definitive local therapy than Caucasians.⁸ Hispanic-Americans as a group also had the largest decrease in definitive local therapy rates from the beginning to the end of the time frame examined (1988-2004). The authors noted that there was an

overall trend of decreasing definitive local therapy because decreases in mastectomy rates were accompanied by increased rates of BCS performed without concomitant RT.⁸

Another study investigated the influence of birthplace on breast cancer diagnosis and treatment for Hispanic-American women. The study used SEER to evaluate 31,012 Hispanic and 372,313 Caucasian women with invasive breast cancer.⁹ The results were intriguing: Hispanic-American women who were foreign-born or who had unknown birthplaces had significantly lower rates of BCS with RT (34.9% and 30.7%) than either American-born Hispanic-American (41.5%) or Caucasian women (38.8%). An additional study published in the same year used SEER to investigate disparities in RT use among patients with locoregionally advanced breast cancer by studying 12,653 patients with invasive breast cancer and 10 + metastatic lymph nodes. This study found that Hispanic-Americans were 20% less likely than Caucasian patients to receive RT.¹⁰

Two years later, the same group of researchers published SEER data from the same patient queue ($n = 12,653$) to determine whether disparities in RT use influence survival in advanced breast cancer and found that the 10-year overall survival (OS) and disease-specific survival rates for Hispanic-Americans were not statistically different from those of Caucasians.¹¹ The presence of RT improved the 10-year OS rate by 7.4% in Hispanic-Americans compared with 11.5% in Caucasians and improved the 10-year disease-specific survival by 3.3% in Hispanic-Americans compared with 10.1% in Caucasians.¹¹ The authors noted that these findings were “illustrative of the previously reported Hispanic paradox, whereby Hispanics demonstrate better than expected outcomes despite poorer access to optimal treatment.”¹¹

The time from surgery to the start of RT is an essential component of optimal breast cancer care and was the focus of a SEER-Medicare analysis involving 18,050 women over age 65 years with stage 0-II breast cancer who received BCS and RT but not chemotherapy.¹² In this study, the mean time from surgery to the start of RT was 34 days; however, 30% of patients did not start RT until more than 6 weeks after surgery. This time lag was independently associated with a 19% increased likelihood of locoregional recurrence and a per-day increased recurrence likelihood of 0.5%.¹² Multivariate analysis found that Hispanic-American ethnicity was an independent risk factor for starting RT after 6 weeks postoperatively.¹²

A subsequent study examining the timelines of RT focused on women aged 65 years or older using SEER-Medicare stage I to III data to examine 38,574 breast cancers that were treated with BCS + RT.¹³ The authors found that increased distance between patients' residence and the nearest RT provider was significantly associated with lower odds of receiving RT within 12 months of diagnosis, particularly for Hispanic-American patients. However, after fully adjusting for once distance to RT provider, racial and ethnic

disparities disappeared for RT initiation within 6 and 12 months of diagnosis.¹³

A later SEER-Medicare study examined 54,592 patients with stage I-III breast cancer who were aged 65 years or older to investigate the role of hospitals in contributing to RT treatment delays.¹⁴ Hispanic-Americans had higher odds of RT delay, but this finding was not statistically significant ($P = .09$). This study found that hospitals that were associated with RT delay were smaller, were not for profit, located in rural areas, had lower breast cancer surgical volume, had fewer cooperative group affiliations, and were less likely to be American College of Surgeons–approved cancer centers. Once these hospital effects were taken into account, racial and ethnic associations with RT treatment delay were attenuated.¹⁴

Most recently, a single-center study examined the demographic risk factors that affect timely RT completion (defined as being within 35-49 days) after BCS by analyzing 261 patients.¹⁵ Although there was no ethnic difference in mean days to RT completion or total RT completion, both Hispanic-American and African-American patients were significantly less likely than Caucasian patients to receive timely RT completion after BCS (56.1% and 52.6%, respectively, vs. 77.6% for Caucasians; $P < .008$).

One single-center study examined the impact of ethnicity on outcomes in 1902 patients with ductal carcinoma in situ of the breast. The study found that Hispanic-Americans were more likely than Caucasians to receive RT after BCS (84.3% vs. 77.2%; $P = .003$) but had no significant difference from Caucasians in breast cancer events (locoregional recurrence, contralateral breast cancer, and/or distant metastases) at 5 years.¹⁶

Two studies used the California Cancer Registry; one examined disparities in adjuvant RT receipt after BCS, examining 85,574 patients in California, and found racial/ethnic disparities only in Los Angeles, where Hispanic-Americans were 14% less likely than Caucasians to receive RT.¹⁷ The second examined 4747 women who received postmastectomy RT and found that Hispanic-American women were 19% more likely than Caucasian women to receive a chest wall boost. The authors also found that women of low socioeconomic status were 26% more likely than affluent women to receive a chest wall boost.¹⁸ One study used the Georgia Comprehensive Cancer Registry to analyze 43,116 patients with invasive breast cancer over a 10-year period and found that Hispanic-Americans were 22% less likely than Caucasians to receive RT.¹⁹

The NCDB was used in one study to analyze 662,117 women with stage I-II invasive breast cancer over an 18-year period to examine receipt of appropriate diagnostic testing and treatments by race/ethnicity. The study found that Hispanic-American women had lower rates of definitive locoregional therapy (defined as BCS + RT, postmastectomy RT in patients with tumors >5 cm or with >3 positive lymph nodes, or mastectomy with or without postmastectomy RT in patients who did not meet strict

criteria for postmastectomy RT) than Caucasian women, even after the analysis was stratified for insurance status.²⁰

Prostate cancer

The first prostate cancer study was a survey-based examination of 204 patients to examine quality of life after treatment of localized prostate cancer. The study found no significant differences in RT receipt between Hispanic-American, African-American, and Caucasian patients.²¹ The second study used SEER-Medicare data to analyze 64,475 men with locoregional prostate cancer and found that Hispanic-Americans were significantly less likely than Caucasians to receive RT as primary therapy (28.6% vs. 38.2%).²² The third study used SEER data to analyze 294,160 patients with clinically localized prostate cancer and found relatively modest differences in RT administration between groups. Hispanic-Americans were more likely to receive surgery and less likely to receive RT than Caucasians.²³

The most recent study used the NCDB to examine 187,730 patients diagnosed with nonmetastatic prostate cancer who received RT as their initial form of definitive therapy to assess national trends in proton therapy use for prostate cancer. Sadly, this study found that both Hispanic-Americans (by 43%) and African-Americans (by 80%) were significantly less likely than Caucasians to receive proton RT, despite the overall use of proton RT for prostate cancer more than doubling over the 9-year period of analysis.²⁴

Lung cancer

A single lung cancer study was found, which was a survey-based study involving 4 New York City medical centers to assess the beliefs of 335 patients with newly diagnosed lung cancer with regard to care. The beliefs of Hispanic-Americans were not significantly different than those of African-Americans or Caucasians with regard to the role, efficacy, and side effects of RT in lung cancer treatment.²⁵

Colorectal cancer

Two studies were found on colorectal cancer. The first examined treatment disparities in 30,968 patients with rectal cancer (2573 Hispanic-Americans and 28,395 Caucasians) using SEER data.²⁶ Although Hispanic-Americans had higher rates of neoadjuvant RT than Caucasians (13.5% vs. 10.4%; $P < .001$) and were 28% more likely to have received neoadjuvant therapy, Caucasians were significantly more likely to have received a sphincter-preserving operation.²⁶

The second study examined patients with colorectal cancer and was a survey-based study assessing the care of native-born versus foreign-born Caucasian, Hispanic-American, and Asian-American patients. There were no

racial or ethnic differences in receipt of adjuvant chemotherapy + RT for stage II/III rectal cancer; however, foreign-born patients were initially less likely than native-born patients to receive chemotherapy + RT, regardless of race. After adjusting for language in the analysis, the difference in receipt of chemotherapy + RT between foreign-born and native-born patients was no longer statistically significant.²⁷

Gynecologic cancer

Three studies involving gynecologic cancer were found. The first used SEER to assess 711 women with uterine adenocarcinoma and the potential reasons for disparities in outcome between Caucasian and non-Caucasian women. The study found no difference in RT or chemotherapy receipt between Hispanic-American and Caucasian women.²⁸

The second study examined type II endometrial cancer (serous, clear cell, or grade III endometrioid) in 14,434 women (13,012 Caucasian and 1422 Hispanic) and found that Hispanic-Americans were significantly less likely to receive RT (39.5% vs. 42.3%; $P = .04$).²⁹ When multivariate models adjusted for RT, there was no difference in OS or cancer-specific survival between Hispanic-Americans and Caucasians.

The most recent study used the NCDB to examine 228,511 patients with endometrial cancer over a 23-year period and found that Hispanic-Americans were less likely than Caucasians to receive primary surgical treatment. Although the incidence of postoperative RT was not directly compared between Hispanic-Americans and Caucasians in this study, the lack of a statistically significant difference in the odds of stage IIIC-IV disease versus stage I disease between Hispanic-Americans and Caucasians in this study ($P = .10$ on multivariate analysis) makes it unlikely that a statistically significant difference in postoperative RT use would have been found between the 2 populations.³⁰

Less common cancers in Hispanic-Americans

Head and neck cancer

Four studies were found that examined head and neck cancer; 2 were SEER studies focusing on laryngeal cancer, and the other 2 were single-center studies. The first SEER study examined 5385 patients with stage III-IV laryngeal cancer diagnosed over an 18-year period (intentionally excluding patients with T4 disease or distant metastases) to assess the relationship between race/ethnicity and the use of RT as initial therapy for larynx preservation.³¹ Multivariate analysis revealed that Hispanic-Americans were not significantly less likely than Caucasians to receive RT for larynx preservation. The second SEER study examined 24,069 patients with laryngeal squamous cell carcinoma and found no difference in receipt of RT between Hispanic-American and Caucasian patients.³²

Both single-center studies came from the same institution. The first examined the influence of limited English proficiency on outcome in 131 patients with head and neck cancer who were treated with RT.³³ In this study, the authors found that Hispanic-Americans and Asian-Americans (grouped together in analysis because of sample size limitations) were less likely to receive RT (60.9% vs. 84.7%; $P = .038$) than Caucasian patients. More importantly, patients with limited English proficiency were less likely to undergo chemoradiation (60% vs. 83.8%; $P = .028$) and had significantly lower 3-year actuarial locoregional control (58.3% vs. 82.2%; $P = .038$) than patients who were proficient in English, regardless of race or ethnicity.³³ This finding is of marked significance for Hispanic-Americans because they may have a higher percentage of limited-proficiency English speakers than Caucasians or other underrepresented minorities, particularly if they recently emigrated to the United States.

The second study examined 91 patients to assess how gross tumor volume (GTV) affected treatment outcome among different race/ethnic groups with head and neck cancer receiving definitive RT (34). Unfortunately the analysis performed grouped all “non-white” patients into a single group (29 African-Americans, 11 Hispanic-Americans, 5 Asian-Americans, and 3 “others”), making it difficult to potentially distinguish Hispanic-Americans from other groups. The authors noted a significant difference in mean primary GTV (21.0 cm³ for “whites” vs. 39.9 cm³ for “non-whites”; $P = .011$) but not in nodal GTV or total GTV between the groups. There were no differences in overall RT duration, total RT dose received, or choice of RT technique (intensity modulated RT vs. 3-dimensional conformal RT) between races/ethnicities.³⁴ The authors also noted that Caucasians had improved local control, nodal control, OS, and disease-free survival compared with “non-whites” and attributed these differences to the volumetric tumor burden at the primary site between the groups.

Sarcoma

Two studies were found on sarcoma; both used SEER data. The first study analyzed 6406 adults with extremity soft tissue sarcoma over a 16-year period.³⁵ Hispanic-Americans received significantly lower rates of limb-sparing surgery (24% lower) than Caucasians and were 12% less likely to receive both surgery and RT for extremity soft tissue sarcoma than Caucasians. The second study analyzed 2104 patients with sarcoma and similarly found that Hispanic-Americans were less likely than Caucasians to receive limb-salvage surgery (80.6% vs. 86.9%; $P = .02$) but were no less likely to receive preoperative RT.³⁶

Lymphoma

One study examined lymphoma. SEER was used to evaluate 7,774 adult patients with stage I-II

mucosa-associated lymphoid tissue lymphoma over a 13-year period. Hispanic-American men and women were each significantly less likely to receive RT. This finding is important because RT administration was associated with a lower chance of lymphoma-related death in the study.³⁷

Central nervous system cancer

One study involved brain cancer: a SEER study examining 22,777 patients with glioblastoma multiforme over a 20-year period to identify predictors associated with omission of RT.³⁸ Hispanic-Americans were 34% more likely to have omission of RT than Caucasian patients with glioblastoma multiforme. The use of RT was significantly associated with improved OS (adjusted hazard ratio = 2.09; 2-year OS of 14.6% vs. 4.2% without RT). These findings remained stable even after examining only patients younger than 50 years of age, an important finding given that Hispanic-Americans are more than twice as likely than Caucasians to be diagnosed with cancer under the age of 50 years.⁵

Pancreatic cancer

A single study examined pancreatic cancer, using SEER to evaluate 697 patients with primary adenocarcinoma of the pancreas, and found that Hispanic-Americans were 50% less likely than Caucasians to receive RT after adjusting for insurance status, tumor size, stage, and patient age.³⁹

Discussion

Unfortunately, disparities in RT access for optimal cancer treatment are as pervasive for Hispanic-Americans as for African-Americans, regardless of organ system, which is sadly consistent with the general trend for underrepresented minorities.^{2,3,40} Hispanic-Americans who are born outside of the United States and/or have limited English proficiency may be more likely to suffer disparate RT access.^{9,27} As with studies examining RT access disparities in African-Americans, the vast majority (77%) of studies investigating Hispanic-American RT access disparities used population-based databases, with cancer of the breast being by far the most common organ system investigated (Table 1).²

Population-based databases have known limitations, such as their retrospective nature and paucity of radiation treatment information details. Further limitations of the current study include the limitations of the search terms used and the comprehensiveness of the PubMed database, which for this study’s search criteria did not reveal outcomes for cervical cancer (which is prevalent in the Hispanic-American population and for which RT plays an established critical role) or of prospective clinical trials (ie, Radiation Therapy Oncology Group or NRG Oncology). Furthermore, potential

key factors influencing the care received by Hispanic-American patients and their prognosis (eg, stage of disease at presentation, health status, socioeconomic status, insurance status, geographic location, education level, cross-border migration) are not discussed in detail, given the scope of this study.

Unlike African-Americans, Hispanic-Americans appear less likely to have mortality figures that are representative of the disparities they experience in RT access in comparison with Caucasians.¹¹ This raises the question of how much better Hispanic-American health could become if access comparable to that of Caucasians with regard to optimal RT care were available.⁴¹ Future prospective studies are needed to better address these issues, as are governmental policies increasing access to quality health care for all. Only then will the plague of health care disparities begin to be addressed adequately.

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