

Disparities in Radiation Oncology

The pervasive crisis of diminishing radiation therapy access for vulnerable populations in the United States, part 1: African-American patients

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Received 11 May 2017; received in revised form 3 July 2017; accepted 11 July 2017

Abstract

Introduction: African Americans experience the highest burden of cancer incidence and mortality in the United States and have been persistently less likely to receive interventional care, even when such care has been proven superior to conservative management by randomized controlled trials. The presence of disparities in access to radiation therapy (RT) for African American cancer patients has rarely been examined in an expansive fashion.

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

Results: A total of 55 studies were found, spanning 11 organ systems. Disparities in access to RT for African Americans were most prominently study in cancers of the breast (23 studies), prostate (7 studies), gynecologic system (5 studies), and hematologic system (5 studies). Disparities in RT access for African Americans were prevalent regardless of organ system studied and often occurred independently of socioeconomic status. Fifty of 55 studies (91%) involved analysis of a population-based database such as Surveillance, Epidemiology and End Result (SEER; 26 studies), SEER-Medicare (5 studies), National Cancer Database (3 studies), or a state tumor registry (13 studies).

Conclusions: African Americans in the United States have diminished access to RT compared with Caucasian patients, independent of but often in concert with low socioeconomic status. These findings underscore the importance of finding systemic and systematic solutions to address these inequalities to reduce the barriers that patient race provides in receipt of optimal cancer care.

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Conflict of interest: None.

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<https://doi.org/10.1016/j.adro.2017.07.002>

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Introduction

African Americans experience the highest burden of cancer incidence and mortality in the United States.^{1,2} Access to optimal medical intervention often means the difference between life and death, yet African Americans in the United States have been persistently less likely to receive interventional care even when such care has been proven superior to conservative management by randomized controlled trials. These inequalities have been repeatedly demonstrated in the surgical realm, spanning subspecialties including pediatric surgery, neurosurgery, colorectal surgery, and cardiothoracic surgery,³⁻⁷ and have proven to persist even after accounting for socioeconomic variables such as income and insurance status.⁸

These disparities have also been prevalent in the field of radiation oncology.⁹ Given the advances in radiation therapy (RT) care, precision, and outcomes over the past 3 decades, disparities in RT access create a more diminished state of care today than at any point in history. This review examines the evidence documenting the barriers African American patients in the United States face in receiving RT despite living in wealthiest country on Earth.

Methods

To accurately assess the literature regarding disparities in RT access for African American patients, a comprehensive search of the PubMed database (<https://www.ncbi.nlm.nih.gov/pubmed>) was conducted for articles up to and including April 15, 2017, using the search terms “African American,” “radiotherapy,” and “disparities” in concert. The search revealed 72 articles, the earliest being published in 2001; of these, 55 investigated RT access by directly examining whether African American patients were more, less, or equally likely than Caucasian patients to receive RT (Table 1).

Results

Most common cancers in African Americans (breast, prostate, lung, colorectal)

The most commonly diagnosed forms of cancer among African American men are prostate (31%), lung (15%), and colorectal (9%), whereas for African American women, the most common cancers are breast (32%), lung (11%), and colorectal (9%). Nearly 190,000 new cancer cases were expected to be diagnosed among African Americans in 2016.¹ For most cancers, African Americans have both the highest death rate and shortest survival of any racial/ethnic group in the United States, with an overall cancer death rate 24% higher in African American men and 14% higher in African

Table 1 African American radiation therapy disparities studies

Cancer type	Number of studies	Database source ^a	Reference numbers
Breast	23	20 of 23	13-35
Prostate	7	6 of 7	36-42
Lung	2	2 of 2	43, 44
Colorectal	3	3 of 3	45-47
Gynecological	5	5 of 5	48-52
Lymphoma	5	5 of 5	53-57
Central nervous system	3	3 of 3	58-60
Sarcoma	3	3 of 3	61-63
Pancreas	2	2 of 2	64, 65
Head and neck	1	0 of 1	66
Esophageal	1	1 of 1	67
Total	55	50 of 55 (90.9%)	

^a Surveillance, Epidemiology and End Result, 26 studies; SEER-Medicare, 5 studies; National Cancer Database, 3 studies; state tumor registry, 13 studies; Medicare, 1 study; other (ie, single-institution databases), 7 studies.

American women compared with their Caucasian counterparts. For breast cancer, African Americans are more likely to present at a younger age, with more aggressive subtypes (ie, triple negative disease), and with metastases at diagnosis.^{2,10,11} Given that RT is the evidence-based standard of care for treating the majority of cancer patients, disparities in access to RT may contribute to the disparate mortality statistics among African Americans.¹²

Breast cancer

By far the most common cancer type examined in RT access disparities among African American has been breast cancer, which comprises more than 40% (23/55) of all studies.¹³⁻³⁵ The 23 studies regarding African American race and breast cancer RT access generally reported differences in utilization of adjuvant RT, hospital type, distance travelled, and survival rates. Twenty of these 23 studies retrospectively analyzed a population-based database such as Surveillance, Epidemiology and End Result (SEER), a hospital-based database such as the National Cancer Database (NCDB), or a state tumor registry (Table 1). The majority reported that African American women were less likely to receive RT after breast-conserving surgery (BCS). One SEER study of 89,110 early-stage (American Joint Committee on Cancer stage I-II) breast cancer patients revealed African American women were 24% less likely to receive adjuvant RT.¹³ Another Medicare study of 34,080 women found Caucasians were 48% more likely than African Americans to receive RT after BCS for invasive breast cancer.¹⁴ A Kentucky Cancer Registry analysis of 11,914 women with BCS for stage 0-II breast cancer found “modestly lower” but not statistically significant RT receipt among African American versus Caucasian women.¹⁵ A

study of 85,574 California Cancer Registry BCS patients found African Americans to be 15% less likely than Caucasians to receive RT.¹⁶ A Maryland Cancer Registry study found African American race to be independently predictive for no initiation of RT after BCS; other predictors were age >80 years and tumor size >2 cm.¹⁷ Most recently, a SEER analysis of 67,124 women undergoing lumpectomy for stage I breast cancer found that African Americans were 18% less likely to receive postlumpectomy RT over a 6-year interval.¹⁸

The role of distance to RT facilities in disparate RT access has also been investigated; the distance to RT facilities has an inverse relationship with BCS and RT use (increased distance results in decreased receipt of BCS and RT), with African Americans 42% less likely than Caucasians to receive BCS + RT in a Florida Cancer Data System analysis.¹⁹ Furthermore, in another study, African Americans were more likely to rely on public transportation to reach RT facilities, which took 7 times longer than private vehicle transportation, representing a significant barrier to receiving optimal RT treatment.²⁰ These studies indicate that African American women with breast cancer were less likely to receive adjuvant RT because of increased distance from RT facilities and decreased access to private vehicle transportation compared with Caucasian women.

The type of hospital at which breast cancer patients receive definitive treatment also contributes to disparities in adjuvant RT access. A SEER-Medicare study of 55,470 women age >65 years with stage I-II breast cancer found that African American women are significantly less likely than Caucasian women to receive care at hospitals with top quartile rates of performing RT after BCS.²¹ A more recent SEER-Medicare study (n = 54,592) also found hospital type to be a significant contributor to delays in adjuvant RT or chemotherapy for women with stage I-III breast cancer; hospitals with high probability of treatment delay (smaller, lower breast cancer surgical volume, rurally located, not-for-profit, and less likely to be American College of Surgeons–approved cancer centers) were more likely to treat African American women than Caucasian women.²²

Another study examined the impact of a tracking and feedback registry in reducing disparities in RT access and utilization. This study found that for stage I-II breast cancer, use of the registry significantly reduced underuse of RT or chemotherapy to the point that minority race was no longer a risk factor for underuse of adjuvant therapy.²³

Several investigations have examined the general role of race in breast cancer care/survival and how African-American race affects RT utilization, all of which were retrospective. The largest studies (12,653 patients from SEER, 662,117 patients from the NCDB) concluded that African-American race independently predicts reduced RT utilization for invasive breast cancer,^{24,25} and a study examining 1,159 patients from a local tumor registry found similar rates of RT regardless of patient race.²⁶ Another study examining 1,902 preinvasive ductal carcinoma in situ (DCIS)

patients from a single-institution database found that African-Americans (and Hispanic-Americans) were more likely than Caucasian women to receive RT.²⁷

Two population-based retrospective studies (n = 12,653 and n = 55,140) assessed the impact of RT disparities on survival in advanced breast cancer; both found African-Americans to have inferior survival compared with Caucasians.^{28,29} Another study examining breast cancer patients regardless of stage in the Atlanta and rural Georgia cancer registries (n = 23,500) had similar findings.³⁰

One study examining 54,682 early-stage operable breast cancer patients from SEER (23,110 node-positive, 31,572 node-negative) found that African-American women were less likely to receive chemotherapy and RT and were significantly more likely to die than Caucasian women, even after adjusting for socioeconomic status.³¹

Other studies have focused on racial disparities in the timeliness of RT treatment. Wheeler et al analyzed 38,574 patients in SEER and found significant differences in RT initiation within the first 6 months of diagnosis; they concluded that such disparities could in part be explained by structural/organizational health system characteristics, such as the type of facility (ie, governmental versus facilities with onsite RT available) used.³² Balasubramanian et al examined 722 early breast cancer patients (237 African American, 485 Caucasian) from the New Jersey Cancer Registry and Medicaid Research files; although they found significant disparities in adjuvant chemotherapy delays, they found no significant differences in RT delays between African American and Caucasian patients.³³ Another study of 2097 stage I-III breast cancer patients age 66 years and older from the Alabama Statewide Cancer Registry revealed no significant difference between African American and Caucasian women with regard to the initiation or completion of adjuvant RT following BCS.³⁴

One SEER study (n = 510) study examined male breast cancer as well and concluded that for men ≥65 years of age with stage I-III breast cancer, there was no statistically significant difference in treatment with either chemotherapy or RT for African American versus Caucasian men, despite the more than 3-fold higher breast cancer–specific mortality for African Americans.³⁵

Prostate cancer

For prostate cancer, 7 articles were found, of which 6 (86%) used population-based databases (Table 1). These articles generally reported differences in urologist referral patterns based on patient race, receipt of prostatectomy and RT, time from prostate cancer diagnosis to treatment, and receipt of optimal care.

The oldest study was the sole manuscript that did not use a population-based database; clinical vignette-based surveys were sent to 2000 urologists to assess how patient race (African American vs Caucasian) and social vulnerability (middle income and married vs low income and

widowed) interacted separately and in combination to affect treatment recommendations (radical prostatectomy vs RT) for localized prostate cancer; 1313 urologists responded.³⁶ African Americans were 14.4% less likely to be recommended prostatectomy than their less-vulnerable counterparts, in contrast to Caucasians being only 4.2% less likely than their less-vulnerable counterparts to be recommended prostatectomy. The authors note that the perception of African American race may amplify urologists' perceptions of social vulnerability and therefore their concerns about poor surgical outcomes and follow-up, even though prostate cancer tends to be more lethal in African American patients, and may explain the reason for low-income African Americans being less likely to be referred for radical prostatectomy than low-income Caucasian prostate cancer patients. They view the results as a good example of the effect of the interaction between patient race and social vulnerability on physician treatment recommendations.³⁶

The manuscripts published since 2006 have all been population based. A SEER study examining 64,475 men with locoregional prostate cancer over an 8-year period investigated the impact of androgen deprivation therapy (ADT) on racial disparities in survival for older men treated for locoregional prostate cancer.³⁷ In this study, RT was associated with a 21% decreased risk of death and RT + radical prostatectomy was associated with a 47% decreased risk of death for this patient population. African Americans were more likely to be diagnosed at a younger age, less likely to be married, and less likely to be highly educated than Caucasian patients. Compared with Caucasians, African Americans were less likely to receive RT + ADT, less likely to receive radical prostatectomy alone, more likely to receive RT alone, and more likely to receive observation alone. The authors conclude that racial differences in mortality "were not affected by racial variations in ADT, but were explained by racial variation in primary therapies."³⁷ Another SEER study (n = 294,160 patients with clinically localized prostate cancer over a 9-year period) attempted to adjust for treatment effects in assessing racial disparities for survival in localized prostate cancer.³⁸ More than one-third of patients received RT; although there were no significant differences in receipt of RT or surgery by race, African Americans still have significantly lower overall survival compared with that of Caucasians and other demographics. The authors found that even after stratifying by primary treatment modality, African Americans were 37% more likely to die than Caucasians.³⁸ Obirize et al used SEER to examine low-risk prostate cancer (n = 54,400 patients over a 5-year period) and found that African American men were 42% less likely to receive prostatectomy or RT than Caucasian men and that, across age groups, African Americans had higher all-cause mortality than Caucasian men.³⁹

Two studies used SEER-Medicare data, which includes patients aged 65 years and older only. The first study examined differences in time from prostate cancer diagnosis to treatment (prostatectomy or RT); after analyzing

23,960 patients, it found that African Americans had a median delay of 4 days for intermediate-risk disease and 9 days for high-risk disease compared with Caucasian patients, with the disparity for some patients exceeding 20 days. Overall, the median delay was 7 days.⁴⁰ This study also found that more than 85% of patients who received treatment did so within 6 months of diagnosis and that African American patients were 2% to 4% less likely to begin treatment within 6 months of diagnosis. The second SEER-Medicare study examined 3789 patients who died of metastatic prostate cancer over an 11-year period and found that in the 12 months preceding death, African Americans were 26% less likely than Caucasians to receive RT and were also significantly less likely to receive several other measures of care (laboratory tests, prostate-specific antigen test, cystourethroscopy, imaging procedures, hormonal therapy, chemotherapy, and office visits) during this time; these findings persisted for both the 3 months preceding death and for the final month preceding death.⁴¹

The most recent manuscript used the North Carolina Central Cancer Registry to analyze 804 prostate cancer patients to assess quality of care and treatment decisional regret.⁴² Although the majority of patients received a high quality of care, African Americans were less likely to receive optimal care compared with Caucasians (66% vs 73%; $P = .03$). The study also concluded that patients who had all treatment options discussed by their physician were significantly less likely to have subsequent patient-reported regret.⁴²

Lung cancer

One study examined 335 lung cancer patients and their beliefs regarding disease-directed treatment. There were no significant differences in beliefs about RT or chemotherapy among African Americans, Hispanic Americans, or Caucasians; an important finding that indicates that disparities in RT access are not attributable to differences in patient preferences by race.⁴³ The other lung cancer study used statewide Medicaid and Medicare data merged with the Michigan Tumor Registry to analyze 2626 older patients with local and regional stage non-small cell lung cancer over a 4-year period and found that African Americans were 42% less likely than Caucasians to receive RT.⁴⁴

Colorectal cancer

Three studies examining colorectal cancer were found. The first used SEER data (2582 Caucasian patients, 134 African American patients) to assess whether African Americans with rectal cancer were less likely to be referred to medical and radiation oncologists.⁴⁵ There was no statistically significant difference in the frequency of African American consultation with radiation oncologists or medical oncologists; those who saw an oncologist were significantly less likely to receive chemotherapy (16%) or

chemotherapy + RT (16%); receipt of RT alone did not reach statistical significance. The authors concluded that the racial disparity in use of adjuvant therapy could not be explained by differences in oncologic consultation rates.⁴⁵ The second study, performed 5 years later, used SEER-Medicare data to assess 11,216 stage IV colorectal cancer patients age >65 years (9935 Caucasian, 1281 African American) to assess race-based differences in consultation rates and in subsequent treatment and found that African Americans were significantly less likely to receive treatment (30% less likely to receive RT), although there was no significant difference in the time from consult to receipt of RT by race.⁴⁶ Although an unadjusted survival analysis found a 15% greater chance of mortality for African Americans, after adjusting for differences in treatment, there was no longer a racially based increased risk of death.⁴⁶ The third study examined 878 patients from a university tertiary referral center to assess racial disparities in outcomes and found no significant difference in receipt of RT, overall survival, or cancer-specific mortality between African American and Caucasian patients.⁴⁷

Less common cancers in African Americans

Gynecologic cancer

Five studies examining gynecologic cancer were identified. The earliest used SEER data to analyze 711 women with uterine adenocarcinoma and found no difference in recommended therapy among African American, Hispanic American, and Caucasian women.⁴⁸ The second used SEER data to examine racial disparities in cervical cancer survival over time; 23,368 women (3886 African American, 19,482 Caucasian) were analyzed over a 15-year period.⁴⁹ African Americans were more likely to receive RT (36.3% vs 26.4%; $P < .001$), less likely to receive cancer-directed surgery (32.4% vs 46%; $P < .001$), and 13% more likely to die compared with Caucasian women after adjusting for several factors, including stage, grade, treatment, and histology.⁴⁹ The third examined vulvar cancer survival over time using SEER data ($n = 5867$; 5379 Caucasians + 488 African Americans) over a 37-year period and found that African Americans were more likely to receive RT (24.2% vs 20.6%; $P < .001$) and less likely to receive surgery (84.2% vs 87.6%; $P = .03$), but were 33% less likely to die compared with Caucasian women despite presenting at a younger age and having a higher rate of distant metastasis.⁵⁰ A fourth study used the NCDB to investigate adjuvant treatment disparities in malignant ovarian germ cell tumors by examining 2196 patients and found no significant differences between African Americans and Caucasians in adjuvant RT or chemotherapy receipt.⁵¹ The fifth study used the NCDB over a 9-year period to assess chemoradiation usage in the treatment of locally advanced cervical cancer.⁵² Analyzing 18,164 patients, several factors were indepen-

dently associated with the lack of chemoradiation usage, including African American race; patients who received RT alone instead of chemoradiation had a 47% increased mortality rate.⁵² This is particularly important given the proven superiority of chemoRT over RT alone from Radiation Therapy Oncology Group 90-01.

Lymphoma

Five studies of lymphoma were found, all of which used SEER; the earliest analyzed 13,321 non-Hodgkin lymphoma patients and found that African Americans were significantly less likely than Caucasians to receive chemotherapy (43.2% vs 52.4%; $P < .01$) or RT (18.2% vs 24.3%; $P < .001$); patients receiving either chemotherapy or RT were significantly less likely to die, regardless of race.⁵³ The second assessed 7774 patients with early stage (stage I-II) marginal zone lymphoma of the mucosa-associated lymphoid tissue and found that 36% of patients received RT as a part of initial treatment.⁵⁴ African Americans were significantly less likely to receive RT, which proved deleterious because RT was associated with an overall reduced likelihood of lymphoma-related death.⁵⁴ The third study examined mycosis fungoides in 4892 patients and found that although African American race was significantly correlated with worse overall survival, there was no significant disparity in RT utilization by race.⁵⁵ The fourth study examined diffuse large B-cell lymphoma over an 11-year period and found that African Americans were 26% less likely to receive RT than Caucasians; survival rates were significantly higher for patients receiving RT.⁵⁶ The most recent study used SEER to examine 7315 patients with stage I follicular lymphoma and found that African Americans were 39% less likely than Caucasians to receive RT ($P < .001$), a first-line treatment option for this disease.⁵⁷ Overall, 36.5% received RT.⁵⁷

Central nervous system

Three central nervous system studies were found. The first examined primary astrocytoma in 604 patients from the Michigan Tumor Registry merged with statewide Medicare/Medicaid data.⁵⁸ In this study, the authors found no racial differences in patients being seen by a radiation oncologist, but they did find that African Americans were 80% less likely to receive radiation than Caucasians. When analysis was limited to glioblastoma multiforme patients, African Americans were 87% less likely than Caucasians to receive RT.⁵⁸ The second study used SEER to analyze 6225 acoustic neuroma (vestibular schwannoma) patients and found no racial disparities in RT access.⁵⁹ The most recent used SEER to assess 22,777 glioblastoma multiforme patients, finding that 74% received RT.⁶⁰ African Americans were 19% less likely to receive RT ($P = .02$); the use of RT was significantly associated with improved 2-year overall survival.⁶⁰

Sarcoma

Three sarcoma studies were found; all used SEER data. The earliest identified 6406 patients with extremity soft-tissue sarcoma (STS) and found that African Americans were 23% less likely than Caucasians to receive adjuvant RT following surgery, while having significantly worse overall disease-specific survival.⁶¹ The second study examined 2104 sarcoma patients who had undergone surgeries and found that although African Americans were 131% more likely to receive preoperative RT than Caucasians, there was no significant difference in limb salvage despite the evidence-based belief that aggressive preoperative RT increases the likelihood of limb salvage in sarcoma.⁶² The most recent evaluated 7601 patients with STS and found that African Americans received RT less frequently ($P = .024$), presented with larger tumors, were less likely to receive surgical resection, and were more likely to die of STS than Caucasian patients.⁶³

Pancreatic cancer

Two studies examined cancer of the pancreas. The first used SEER data to evaluate 697 patients with primary adenocarcinoma of the pancreas and found that African Americans were less likely to receive chemotherapy but not RT compared with Caucasian patients.⁶⁴ The most recent study used the California Cancer Registry to assess 20,312 American Joint Committee on Cancer stage I-IV pancreatic cancer patients and found that although African Americans were as likely as Caucasians to present with resectable disease, they were 34% less likely to receive surgery and 25% less likely to receive adjuvant or primary chemotherapy \pm RT.⁶⁵

Head and neck cancer

A single study was found that retrospectively examined 131 patients from a single institution with biopsy-proven head and neck cancer (nonmetastatic, nonrecurrent) who completed curative-intent RT.⁶⁶ There were no statistically significant differences by race with regard to treatment intent, time from diagnosis to start of treatment, or treatment duration.⁶⁶

Esophageal cancer

The final study found used SEER data to examine 1522 patients with T0-T2, node-negative esophageal cancer. Although there was no racial disparity in receipt of postoperative RT, African Americans were significantly less likely to receive surgery (44% vs 66%; $P < .001$) and significantly more likely to receive RT as the sole treatment (43% vs 22%; $P < .001$). African American race was initially associated with worse overall survival, but when

treatment modality was added to the multivariate model, race was no longer a significant predictor of survival.⁶⁷

Discussion

Despite the many advances stemming from the 20th-century Civil Rights movement, disparities in RT access for African Americans remain prevalent and persist in the treatment of cancer across a large number of organ systems. The diminished RT access in many instances is independent of, yet often in concert with, low socioeconomic status. These findings underscore the importance of finding systemic and systematic solutions to address these inequalities to reduce the barriers that patient race provides in receipt of optimal cancer care. Another important conclusion is the relative dearth of exploration of cancers of the central nervous system, head and neck, pancreas, and esophagus regarding RT access. These organ systems represent fertile soil for future investigation.

Limitations of this study include the comprehensiveness of the PubMed database, the limitations inherent to the search terms themselves (“African American,” “radiotherapy,” “disparities”) and the heavy reliance of the literature (more than 90%) on large secondary databases such as SEER or the NCDB (Table 1); these databases have known limitations regarding the details of radiation treatment information. Furthermore, few of these studies used propensity score matching when examining the role of race as an independent predictor of RT receipt. The term “African American” was used instead of “black” to ensure that only patients and hospitals from the United States were included; this may have excluded additional published studies examining RT access disparities that referred to African Americans solely as “black.”

A feasible method of addressing the disparities identified in this manuscript is to increase nationwide access to government-sponsored health insurance, such as Medicare, and to incentivize health care providers to accept this insurance.⁶⁸ Although disparities involving African Americans and other vulnerable populations are often independent of socioeconomic status, it is also true that these patients are more likely to have low socioeconomic status and less likely to have access to private or Medicare insurance compared with Caucasian patients.^{68,69} For these reasons, measures to reduce dependence on the purchase of private health insurance could provide an enormous benefit for underrepresented minorities, while aiding tens of millions of people throughout the United States regardless of race, including millions of Caucasian patients who lack health insurance despite implementation of the Affordable Care Act in 2010.^{68,70} The health benefits of insuring patients can be further increased by designing insurance policies that account for social and medical determinants of health. For example, African Americans and other underserved populations are more likely to have comorbid illness that affects

their cancer care and to face social issues such as transportation barriers. Wider availability of insurance-sponsored health care navigators and transportation services might therefore increase the likelihood of individuals being medically and socially optimized to receive complete courses of cancer therapy.

Although increasing insurance coverage has great potential to decrease disparities in receipt of RT, the persistence of disparities even among similarly insured populations suggests that research must be performed to investigate additional strategies for increasing RT access for African Americans. One important strategy to increase RT access and utilization for African Americans is the development of a more culturally competent workforce. Data show that race concordance among physicians and patients influences receipt of care for African Americans.⁷¹ These data suggest that diversification of the physician workforce may improve outcomes for African Americans. African Americans are severely underrepresented in most, if not all, oncological specialties, so further attention should be given to enhancing the pipeline of African American oncologists.^{72,73} In addition to increasing the number of African American oncologists, work should also be performed to increase the likelihood that African Americans receive high-quality care regardless of the racial/ethnic background of their providers.⁷³ This involves interventions such as cultural competence training to help dedicated providers deliver care to patients of diverse backgrounds, and unconscious bias training to help providers understand how preconceived notions may inadvertently affect their treatment recommendations.⁷⁴ Furthermore, future clinical trials stratifying patients by race and then using race to prospectively examine outcomes will be needed to optimally validate the vast majority of studies present in the literature, which are retrospective in nature.

Recently, there has been a reinvigorated zeal to address global RT access to every single person outside of the United States regardless of gender, race, religion, or socioeconomic status.⁷⁵ Although this is a noble mission, it is important that we as a medical community never neglect the equally noble task of bridging the barriers preventing many in our own country from receiving RT, barriers which in some cases are as great as those in the poorest nations experience.

Supplementary data

Supplementary material for this article (<https://doi.org/10.1016/j.adro.2017.07.002>) can be found at www.practicalradonc.org.

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