

A Review of Healthcare Disparities Relevant to Interventional Radiology

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Abstract

Racial, ethnic, and gender disparities have received focused attention recently, as they became more visible in the COVID era. We continue to learn more about how healthcare disparities manifest for our patients and, more broadly, the structural underpinnings that result in predictable outcomes gaps. This review summarizes what we know about disparities relevant to interventional radiologists. The prevalence and magnitude of disparities are quantified and discussed where relevant. Specific examples are provided to demonstrate how factors like gender, ethnicity, social status, geography, etc. interact to create inequities in the delivery of interventional radiology (IR) care. Understanding and addressing health disparities in IR is crucial for improving real-world patient outcomes and reducing the economic burden associated with ineffective and low-value care. Finally, the importance of intentional mentorship, outreach, education, and equitable distribution of high-quality healthcare to mitigate these disparities and promote health equity in interventional radiology is discussed.

Keywords

- ▶ healthcare disparities
- ▶ interventional radiology
- ▶ race
- ▶ ethnicity
- ▶ equity

Overview

Despite breakthrough technological advancements in medicine over the past few decades, a significant proportion of Americans experience poor health outcomes due to their identity, and their social or economic circumstances. Health disparities arise due to a complex interplay of nonbiologic factors such as poverty, educational or linguistic barriers, and lack of access to healthy foods, transportation, and healthcare (▶ **Fig. 1**)¹ Although there is currently no consensus on the exact impact of each factor on health, there is now a strong consensus that social determinants of health, defined as the conditions characterizing where people are born, live, work, play, and worship, play a central role in shaping health outcomes.² Furthermore, racism has an additive detrimental effect on both mental and physical health, by driving and perpetuating inequities in access to healthcare.³ Reducing health disparities is vital to optimizing the general health of

our nation. Marginalized communities, including people of color, face elevated rates of illness and mortality across a large number of health conditions. Moreover, research indicates that health disparities come with significant economic burdens in the form of ineffective and low-value care.⁴ In a recent report, racial and ethnic health disparities alone resulted in an estimated economic burden of 421 billion USD in 2018. A significant portion of this burden was attributed to the poor health outcomes experienced by Black Americans and other disadvantaged minority groups of American Indians, Alaskan Natives, Native Hawaiians, and Pacific Islanders.⁵

Similar to other medical disciplines, interventional radiology (IR) is not immune to healthcare disparities. To address inequities affecting our patients, it is crucial to first acknowledge their presence, comprehend their scale, and identify the underlying factors driving them. This review aims to provide a focused summary of disparities relevant to interventional radiologists.

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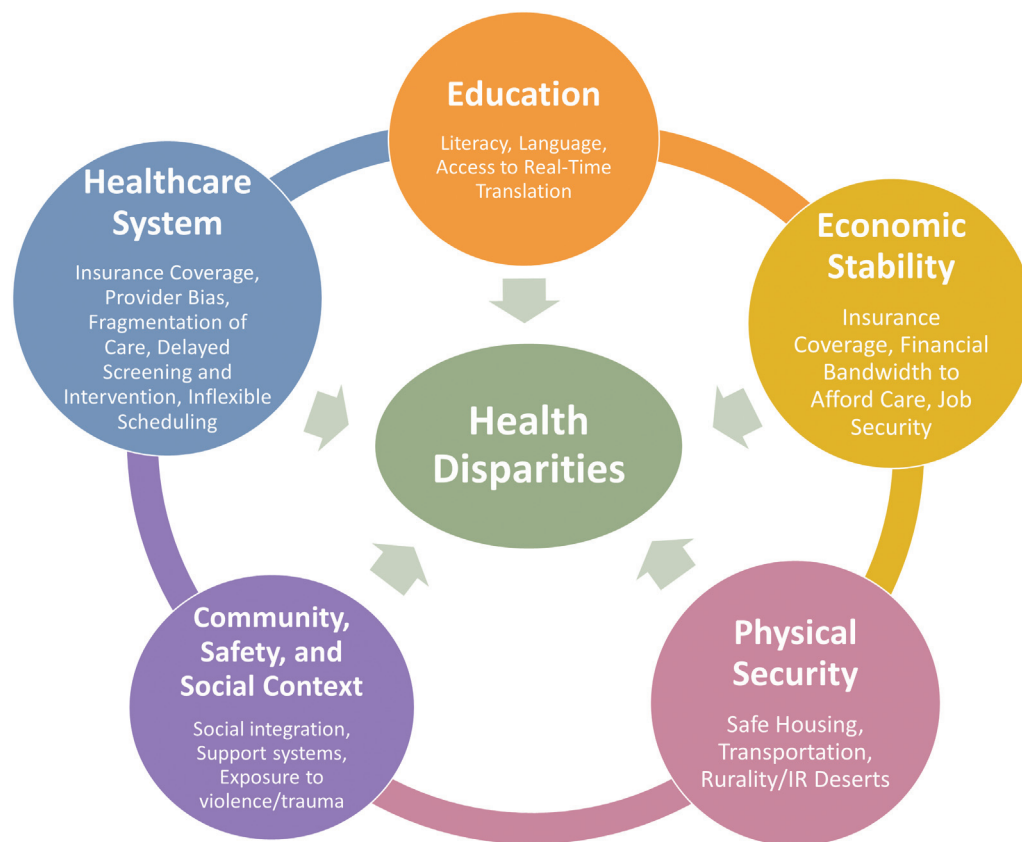


Fig. 1 Multidomain factors associated with the generation of healthcare disparities relevant to interventional radiology.

Disparities in the IR Workforce

Before looking broadly at healthcare disparities affecting our patients, let us begin with a look at our workforce, where there are both ethno-racial and sex-based disparities. Women represent approximately 50% of medical graduates but are underrepresented in radiology, accounting for 26.9% of the active workforce in 2021 as reported by the American Association of Medical Colleges.⁶ Things are worse in IR which stands out as one of the most male-dominated medical specialties. By one recent measure, women accounted for approximately 13% of academic faculty in the United States in 2019.⁷ By another measure, women constitute just 9% of the Society of Interventional Radiology membership.⁸

The history of IR, going back to Charles Dotter, is one of constant innovation driven by close collaboration between clinical proceduralists and technology companies. As a potential manifestation of how much we, as a community, embrace the influence and expertise of our female colleagues, a striking observation is how few women interventional radiologists have consultation roles with industry partners. In 2018, although women constituted 13% of academic IR physicians in the United States, only 1% of industry consultation payments were received by female physicians. This gap persisted irrespective of academic rank, h-index, or years since medical school graduation and did not show signs of improvement over time.⁷ There is evidence that we are headed in the right direction more recently. Between 2017 and 2021, there was a noticeable

increase in the proportion of female-integrated IR trainees, rising from 10.5 to 22%.⁹ In a recent survey examining gender-specific factors associated with medical students considering IR, female respondents reported significantly lower access to mentors, indicated a strong desire for same-sex mentorship, and conveyed concerns about working in a male-dominated environment. In the same survey, exposure to radiation and opportunities to raise a family were not identified as significant deterrents in contrast to prior studies¹⁰ which suggest improving awareness of the specialty. Improving the visibility and mentorship capacity of women interventional radiologists is important to reduce this workforce disparity. Finding a female IR mentor within a small existing workforce is a meaningful hurdle for female students considering the specialty. A relative abundance of male IR physicians taking on more visible roles, as consultants, speakers, and potential mentors, may exacerbate the existing gender gap, further reducing the likelihood of women choosing this field.¹¹

In terms of race and ethnicity, Black (2%) and Hispanic (6.2%) physicians remain strongly underrepresented within the IR workforce and training pathways. The representation of different racial and ethnic minorities in IR has subtly and incrementally increased over the past two decades and in absolute terms, the percentage of all minority groups (Black, Hispanic, and combined American Indian, Alaskan Native, Native Hawaiian, and Pacific Islander) remains low.⁶ These workforce disparities demand proactive engagement of the future workforce, based on what we know in the published

literature. Opportunities for engagement and pipeline development are abundant and we can all be part of the solution through intentional mentorship and outreach to women and other under-represented medical students. In constructing high visibility educational content, we must be especially mindful. The demographic makeup of this more visible cohort of interventional radiologists on national platforms likely implicitly messages who we welcome as the future of our workforce.

Disparities among Transgenders/Sexual Minorities

LGBTQ individuals face notable health disparities and obstacles, which hinder their access to quality care. Discrimination, rooted in actual or perceived homophobia, biphobia, or transphobia, often leads them to avoid or postpone seeking medical attention or receive inadequate treatment. This discrimination can occur both at the hands of healthcare providers and within healthcare institutions. LGBTQ patients may also be underrepresented in clinical research, although a definitive assessment is difficult since most trials do not collect relevant data.¹² Numerous studies have demonstrated that even basic learning modules focusing on LGBTQ topics have proven beneficial in increasing the comfort levels of both healthcare providers and patients, allowing for improved care.¹³ The estimated population size of the transgender (TG) community in the United States is between 0.5 and 2.0%.^{14–16} Up to 23% of TG individuals report being denied essential medical care due to their gender identity and 28% postpone seeking medical attention even when they are sick or injured, fearing discrimination within healthcare settings.^{17–20} Within the realm of IR, where anxiety is already a common experience for many patients, TG patients may experience even greater levels of anxiety. They must navigate through the additional challenges of fear and vulnerability that are unique to their experiences in general healthcare settings, especially during procedures that may involve exposure to their sensitive body anatomy. Again, education on issues related to transgender care has the potential to significantly improve access and outcomes for these patients by facilitating a higher level of comfort and trust in the providers they interface with.^{17,21}

Disparities by Disease Group

Pulmonary Embolism Interventions

Pulmonary embolism (PE) is the third most common cause of cardiovascular-related mortality.²² This condition has a disproportionately large impact on Black patients, through a combination of factors including higher disease severity, lower access to effective treatments, and worse outcomes when treatment is conferred. Among those who experience symptomatic PE, Black patients are twice as likely to be hospitalized compared with White patients.²³ Furthermore, Black patients experience a 50% higher age-standardized risk of PE-related mortality compared to their White counterparts.²⁴ Differential access to effective treatments may be a

factor responsible for poor outcomes. In a national study examining the use of three common treatments for PE (thrombectomy, catheter-directed thrombolysis, systemic thrombolysis), Black and Hispanic patients had lower use of endovascular treatment (49 and 48% respective) compared with White patients (55%) despite a higher disease severity. Even among patients who did receive endovascular treatment, Black patients had a higher likelihood of in-hospital mortality from acute PE compared to White patients.²⁵

These claims data findings have been corroborated by an extensive study encompassing data from more than 20 hospitals. In this real-world cohort, Black patients exhibited a greater severity of PE on presentation when compared to age- and sex-matched White patients. Furthermore, as compared to White counterparts, Black patients with intermediate severity of PE had a lower likelihood of receiving any kind of intervention (10.9 vs 7.8%), such as systemic thrombolysis (1.0 vs. 0.2%), catheter-directed thrombolysis or surgical embolectomy (5.6 vs. 2.5%), and/or inferior vena cava (IVC) filters (5.2 vs 4.5%). Notably, Black patients presented with PE at a younger age, approximately 10 years earlier than White patients, and a slightly higher percentage of Black patients were women (56% Black vs. 52% White).²⁶ As compared to men, women who underwent percutaneous pulmonary artery thrombectomy were at significantly higher risk of procedural complications such as procedural bleeding (16.9 vs. 11.2%), needing more blood transfusions (11.9 vs. 5.7%) and experiencing higher rates of vascular complications (5.0 vs. 1.5%). Furthermore, women had 7.6% higher in-hospital mortality as compared to men.²⁷ We do not understand why this difference in complication rate exists at this time.

These disparities may stem in part from differences in how and where PE care is provided. Unconscious bias can influence a provider's decision-making process regarding the most suitable treatment for a specific patient. This has been well documented in the management of coronary artery disease. Percutaneous coronary intervention (PCI) and intravenous thrombolytics are considered first-line treatments for symptomatic coronary artery disease.²⁸ Studies show that Black patients are less likely than White patients to undergo life-saving invasive cardiac procedures, such as coronary angioplasty, and coronary artery bypass surgery. Even after considering factors such as sociodemographic background, comorbidity, and hospital-based influences, this disparity remained.²⁹ In a separate study, a blinded computerized survey using scripted actor interviews was used to evaluate biases in physicians' recommendations for cardiac catheterization. Their findings revealed that both race and sex had independent effects on how physicians approached chest pain management. Specifically, women and Black patients were less frequently referred for catheterization compared to men and White patients, respectively.³⁰ Being aware of the possible role of unconscious bias in the treatment of patients with PE is an important first step to mitigating disparities. To that end, Pulmonary Embolism Response Teams (PERTs), which involve a team-based approach to decision-making, have the potential to reduce the likelihood of bias influencing

treatment decisions by increasing the number of stakeholders involved in decision-making.²⁵

Neurointervention

Endovascular thrombectomy has been a significant advancement for patients who experience a cerebrovascular accident (CVA), with nearly 85% of strokes being ischemic. With improving recognition and management of underlying risk factors, there has been a documented decrease in the incidence and mortality associated with cerebrovascular stroke.³¹ Disparities in race, gender, and age exist in the incidence and outcomes of stroke care. Research shows that Black patients are at two times the risk of having a new stroke and higher stroke-related mortality than their White counterparts.³² Women are also disproportionately affected by stroke³³ and are also more likely to present initially with severe neurologic impairment. Furthermore, women are less likely to receive acute stroke treatment and have significantly worse 30 days and 1-year functional outcomes following hospitalization.^{34–36} A study examining a 10-year trend (from 2008 to 2017) in the use of tissue plasminogen activator (tPA) and mechanical thrombectomy (MT) in stroke patients using national claims data observed a stark difference in the utilization of IV tPA and MT in different age groups. Patients aged 18 to 39 years have the highest utilization of tPA at 12.3% and those with age ≥ 90 years have the lowest utilization of tPA at 7.9%. Over the years, the use of both procedures has increased in all age groups, but surprisingly the increase is higher in patients aged ≥ 90 years than those aged 18 to 39 years (15.4% increase annually vs. 11.5% increase annually). Similar results were observed for the usage of MT; i.e., the prevalence of MT in aged 18 to 39 years was 2.8%, whereas that in ≥ 90 years was 0.7%, and the annual percentage increase for the younger group was 28.3% as compared to 49.2% in the older age group. Utilization of both procedures was significantly lower in Black patients than in White patients of all age groups except the 18- to 39-year-old group. More recent studies indicate that racial and gender-based gaps in the use of IV tPA and MT are closing, but significant work remains to be done.³⁷

Notable disparities have also been observed in the use of carotid endarterectomy (CEA) which addresses the presence of at-risk plaque in high-risk patients, based on both sex and race. Black patients undergo fewer CEA procedures than White patients³⁸ and are more likely to experience delays in scheduling the intervention compared to their White counterparts following the identification of carotid stenosis.³⁹ These findings are consistent across the literature focused on various manifestations of cardiovascular disease, whereby Black patients are more likely to receive lower and delayed access to effective treatments, leading to worse outcomes.

Dialysis Interventions

Black individuals account for 30.5% of patients with end-stage renal disease (ESRD) despite representing only 18% of the U.S. population.⁴⁰ Research indicates that the prevalence of early stages of chronic kidney disease (CKD) is comparable

between Black and non-Black individuals. However, Black individuals are three to four times more likely to advance to ESRD exacerbated by lower access to pre-ESRD care. Additionally, minority patients are four times more likely than their White counterparts to require renal replacement therapy, with Black patients experiencing the highest incidence. Black patients exhibit a 60% lower likelihood of receiving treatment with home hemodialysis, a 47% lower likelihood of being treated with peritoneal dialysis, and a 42% lower likelihood of having a functional kidney transplant.⁴¹ In a recent retrospective review encompassing data from 669 patients spanning the years 2007 to 2021, it was observed that Black patients with a dialysis conduit are approximately twice as likely to undergo additional surgical procedures, which included both the maintenance of existing fistulas and the creation of new ones, in comparison to patients from other racial backgrounds.⁴² A large national study of first-time dialysis conduit recipients revealed that AV grafts (as opposed to fistulae) were created with higher frequency in women and non-White minority patients (32% women vs. 23% men; 39% Black, 32% Hispanic, 29% Asian vs. 21% White). Following endovascular interventions to prolong conduit patency, women are at higher risk of postintervention patency loss (hazard ratio: 1.49) and Black patients are at higher risk of postintervention thrombosis (hazard ratio: 1.29).⁴³ In summary, disparities affecting ESRD patients are a manifestation of unequal access at every disease stage, including conduit interventions performed by interventional radiologists. We can do our part by being cognizant of these tendencies and perhaps considering closer follow-up in groups that are at high risk for patency failure after endovascular intervention.

Hepatocellular Carcinoma Interventions

Hepatocellular carcinoma (HCC) is the fifth most common cancer worldwide and is the second leading cause of cancer death in men.⁴⁴ Five-year survival of HCC is as low as 18% and second only to pancreatic cancer.⁴⁵ Disparities have been documented throughout HCC care, starting with disease diagnosis to management and survival. HCC surveillance with semiannual ultrasounds in patients with high-risk cirrhosis is associated with earlier tumor detection and access to effective treatment options, which ultimately improves survival.⁴⁶ Only a small percentage (13%) of patients with cirrhosis receive annual surveillance and less than 2% receive surveillance twice a year. However, the rate of surveillance is even lower among Black and underinsured patients.⁴⁷ In terms of treatment for HCC, Asian patients are more likely to receive local or surgical therapy compared to their White counterparts, while Black and Hispanic patients had considerably lower documented treatment rates.⁴⁸ Low socioeconomic status (LSES) is strongly associated with higher incidence, higher stage at diagnosis and lower 5-year survival with HCC, irrespective of race/ethnicity and sex.⁴⁹ Despite the higher incidence of HCC among Hispanic and racial minorities, evidence suggests that minorities have lower utilization rates of localized/curative therapies such as tumor ablation, hepatic resection, and liver transplant.

Consequently, there are higher mortality rates observed among Black and Hispanic populations.^{50,51} Finally, there is significant documented underrepresentation of racial and ethnic minorities in HCC transarterial therapy clinical trials which can limit the generalizability of novel treatment effects to these highly affected populations.⁵²

Portal Interventions

Transjugular intrahepatic portosystemic shunt (TIPS) is an effective percutaneous means of reducing portal venous pressure in patients with decompensated portal hypertension, conferring survival benefits for the major indications of refractory ascites and variceal bleeding.⁵³ Despite comprising around 29% of the overall U.S. population and accounting for 10% of cirrhotic admissions in the country, Black patients comprise a smaller than expected portion of those undergoing TIPS creation, less than 6% of cases.⁵⁴ This is further corroborated by the separate observation in national data that Black and Hispanic patients are less likely to undergo TIPS creation compared to White patients. Specifically, after adjustment for multiple factors including age, sex, disease severity, type of health insurance, comorbidities, and hospital characteristics, the odds of undergoing TIPS creation among patients with decompensated cirrhosis was 0.37 in Black and 0.69 in Hispanic patients, as compared to White counterparts. Patients with Medicare or Medicaid, and those without any insurance, were also less likely to undergo TIPS creation compared to those with private insurance. Among patients undergoing TIPS creation, Black patients have two to three times higher severity-adjusted mortality.⁵⁵ Significant racial disparities exist in the management of complications of portal hypertension. Both radiological and surgical shunt procedures are successful in reducing rebleeding from varices, decreasing mortality and improving quality of life.⁵⁶ Upstream of TIPS creation, timely management of variceal bleeding is critical after presentation and typically involves endoscopic evaluation and treatment. As compared to White patients (17%), a higher percentage of Black (23%) received delayed endoscopy (defined as a delay of >24 hours after hospitalization). The chance of getting delayed endoscopy is also greater in patients with Medicare and Medicaid as opposed to those with private insurance. The likelihood of in-hospital mortality in patients admitted with portal hypertension is significantly higher among those who are uninsured.⁵⁴

In summary, Black and to a lesser extent Hispanic patients with decompensated cirrhosis have lower access to effective treatments including TIPS creation, are more likely to have delayed treatment, and are more likely to die despite treatment. Therefore, efforts to address these inequities must focus on timely and effective disease management upstream in the disease process, in collaboration with hepatologists, gastroenterologists, and emergency physicians. There is a certain additional contribution of lower access to IR treatments for disadvantaged groups (minorities, lower insured) that we must reckon with and proactively work to mitigate.

Inferior Vena Cava filters

IVC filters are indicated to prevent PE in a select group of patients including those who have venous thromboembolism

(VTE) and contraindication or nonresponse to anticoagulation.^{57,58} The introduction of retrievable filters led to a massive upsurge in IVC filter placement in patients, with an indication drift beyond well-accepted ones. IVC filters can selectively be used in a prophylactic context, in patients with a high risk of VTE such as with long-term immobilization, including surgery, and medical conditions that induce hypercoagulable state despite the fact that there are no immediate- or long-term differences in mortality from PE.⁵⁹ It has been observed that prophylactic IVC filters are disproportionately utilized in Black patients, despite the known relatively high risk-to-benefit ratio. As compared to White patients, prophylactic use of IVC filters was threefold higher in Black patients despite having a low risk for VTE. Furthermore, the likelihood of 30-day adverse outcomes was higher among Black patients after undergoing IVC filter placement.⁶⁰ This excessive utilization and simultaneous under-retrieval of IVC filters have resulted in considerable morbidity in the form of filter migration, perforation, fracture, and recurrent DVT that could be avoided.⁶¹ More broadly, several factors are associated with a higher rate of IVC filter placement; these include advanced age; male gender; White race; residing in the Northeast, South, or West census region; and a higher comorbidity score.⁶² Some of these patient factors are also associated with *under*-retrieval: older age, residing in the Northeast or South census region, and greater comorbidity score. Among those who do have their device removed, Black patients, on average, encountered longer wait times for the retrieval procedure compared to their White counterparts.⁶³ Addressing disparities in this domain largely revolves around providing updated guidelines and concordant care across patient groups.

Spine Augmentation Interventions

Spine procedures such as kyphoplasty are indicated for recent vertebral compression fractures related to osteoporosis and intractable pain. With the ageing U.S. population, the prevalence of osteoporosis among individuals 50 years and older stands at approximately 10.3%.⁶⁴ Studies have shown that men are less likely than women to undergo treatment for osteoporosis (2.2 vs. 8.9%) and osteoporotic hip fractures (27 vs. 71%).⁶⁵ Moreover, an analysis of different racial groups demonstrated that Black, Hispanic/Latino, Asian/Pacific Islander, and other minorities were less likely to receive surgical management compared to White individuals. Patients treated in urban hospitals are more likely to undergo augmentation procedures compared to those in rural hospitals. Additionally, patients in private hospitals had a statistically higher likelihood of undergoing spine augmentation when compared to patients in public hospitals which may reflect economically incentivized over-use.⁶⁶ Gaps in access to pain management, including pain assessment and prescription of analgesics, can significantly contribute to delayed diagnosis and inequitable utilization of procedural interventions. Research indicates that Black patients and other minority patients are less likely to be administered pain medication, particularly opioids, compared to White patients. This discrepancy is especially pronounced among patients experiencing back pain.⁶⁷⁻⁷¹

Peripheral Arterial Disease Interventions

Peripheral arterial disease (PAD) is a leading cause of limb loss. Despite breakthrough advancements in the management of PAD with medical and surgical techniques, significant disparities exist in the rate and outcomes of lower extremity amputation among people of different races, ethnicity, and socioeconomic status.⁷² Efforts to delay and prevent adverse clinical events like lower extremity amputation rely on timely and aggressive therapies involving medical interventions, behavioral changes, and revascularization. However, limited access to subspecialty PAD diagnosis poses a barrier to implementing aggressive primary and secondary prevention strategies and restricts the effectiveness of limb salvage efforts, including revascularization, in advanced diseases.⁷³ A new study analyzed the Vascular Quality Initiative registry data from 2003 to 2020, studying patients who underwent infra-inguinal revascularization (open or endovascular) or amputation for symptomatic PAD. Results showed that patients of LSES had severe disease upon presentation including rest pain or tissue loss as compared to claudication, and had lower rates of revascularization.⁷⁴ Patients with LSES, residing in rural areas, and communities with a high proportion of Black population experienced poorer health outcomes.⁷⁵ Regions with higher proportions of Black residents exhibited elevated amputation rates compared to regions with lower proportions of Black residents. Additionally, regions characterized by LSES demonstrated higher amputation rates, even after considering clinical and demographic factors.⁷⁶ Around one-third of Medicare patients who eventually underwent lower extremity amputation did not undergo any diagnostic arterial testing (such as ankle-brachial index, CT, MRI, or invasive angiography) within 1 year preceding the amputation. This points toward a lack of early diagnosis and subsequent management with early revascularization to preserve the limb.⁷⁷ Patients with critical limb ischemia who are African American, Native American, and with LSES have almost two to three times higher risk of undergoing amputation than White patients.⁷⁸ Additionally, attempts at limb salvage are less likely in Black patients with critical limb ischemia.⁷⁹ Another study by de Jager et al demonstrated the barrier to appropriate, effective, and timely care for patients with LSES residing in rural areas as they had higher rates of presentations with complications, higher amputation rates, and increased rates of emergency versus elective surgery.⁸⁰ Finally, studies have demonstrated that Black individuals face a significantly increased risk of graft failure following lower extremity bypass surgery.^{81–83}

Renal Cell Carcinoma Interventions

RCC is the most common primary tumor of the kidneys and accounts for 80 to 85% of cases of primary renal neoplasms. Since the mid-2000s, the incidence rate of RCC has been on the rise in the United States.⁸⁴ The incidence of renal cancers even in this context is relatively higher among Black compared to White individuals over the past 5 years.⁸⁵ Mortality from RCC has decreased over the past two decades because of advancements that allow earlier detection and treatment.

Survival rates for stage 1 RCC are more than 90% and for stage 2 it is 79%, but survival rates drop to 40% with lymph node involvement. Thus, earlier diagnosis and implementing stage and patient-specific treatment are crucial to prolong survival.⁸⁶ The treatment of choice for stage 1 RCC is nephrectomy or partial nephrectomy which is usually curative. Percutaneous radiofrequency ablation or cryotherapy are effective treatment alternatives.⁸⁷ The totality of studies examining race-based differences in access to and outcomes of RCC treatments demonstrates that Black patients are less likely to be treated at all, less likely to undergo ablation versus surgery, and experience worse outcomes. Black patients who were diagnosed with RCC are of younger age, residents of areas with low median income, and with higher comorbidity scores than their White counterparts. The chances of being diagnosed with RCC at an early stage and managed with nephrectomy were significantly lower for Black (61.2%) compared with White patients (70.4%) even after adjusting for relevant confounders like other demographics, cancer stage, tumor size, and comorbidities. Among Black patients with stage 1 RCC, the use of partial and radical nephrectomy is more prevalent over percutaneous ablation as compared to propensity-matched White patients with stage 1 RCC.⁸⁸ Additionally, Black patients with localized RCC had a 7% lower likelihood of undergoing nephrectomy and a shorter overall median survival rate compared to White patients (2.6 vs. 3.2 years).⁸⁹ All of this likely contributes to recent observations that 5-year survival with RCC has improved in White patients, but the gain has been much more muted for Black patients with RCC.⁹⁰ Like other oncologic disparities seen with our patients, multidisciplinary and locally protocolized care pathways deployed across patient groups are likely to significantly improve outcomes.

Chronic Venous Disease Interventions

Chronic venous insufficiency (CVI) is a morphological and functional abnormality of the venous system that primarily affects the lower extremities. Estimates indicate that over 2.5 million of the U.S. population have CVI and around 20% of them develop venous ulcers.⁹¹ CVI is more prevalent among women, with an annual incidence of 2.6% as compared to 1.9% for males.⁹² When conservative therapies such as compression garments fail, interventional therapies such as sclerotherapy and⁹³ endovenous ablative therapy⁹⁴ can be effective. Black patients tend to present with advanced chronic insufficiency with a CEAP score of 5 or 6 and at a younger age than their White counterparts, who are more likely to present with a CEAP score of 4. Similarly, White patients receive more aggressive treatment such as vein stripping and/or ligation at earlier disease stages. Black patients on the other hand undergo more ulcer debridement yielding a higher cost of care. In this context, there are no significant differences in access to sclerotherapy.⁹⁵ In terms of deep vein interventions, a study examining patients who underwent iliac vein stenting suggested that Black patients have a higher reintervention rate and the longest average follow-up after endovascular treatment, followed by Hispanic, White, and Asian patients.⁹⁶ Studying the use of different procedures (standalone ablation, ablation with phlebectomy,

and ultrasound-guided foam sclerotherapy with ablation and phlebectomy), Hispanic patients required the fewest overall procedures, whereas Black patients required the highest number of procedures to achieve an optimal result. Postprocedural outcomes were measured using revised Venous Clinical Severity Scores (rVCSSs) among racial groups. Hispanic and Asian patients had lower rVCSSs post standalone ablations and Hispanic patients showed improved rVCSSs after ablations with phlebectomy. All races had similar outcomes when ultrasound-guided foam sclerotherapy was combined with ablations and phlebectomy.⁹⁷ The literature is relatively immature as far as understanding targetable drivers of access and outcome differences for patients with chronic venous disease.

Conclusion

Disparities affecting patients treated by interventional radiologists are manifestations of system-level, patient-level, physician-level, and societal factors, many of which are summarized in detail here. One simple way to conceptualize how disparities are systemically generated is to consider each instance of our inability to adjust to a vulnerable patient's various needs as an additive contributor. Our healthcare systems, for the most part, do not change the level of resources to match patient needs, resulting in many of the described disparities in this review. To move forward, as a starting point, we need to be able to identify patients with high disadvantages in a facile manner during routine clinical care. For that reason, the Area Deprivation Index (or Neighborhood Deprivation Index) is getting attention as a multidimensional, quantitative, and practical tool to characterize patient's level of disadvantage. Numerous indicators of socioeconomic disadvantage are compiled and calculated together into a composite ADI score.^{98,99} Indicators assessed include income, education, employment, housing quality, and access to resources which all can affect an individual's overall health and well-being. Higher ADI scores are associated with decreased healthcare utilization, delayed or inadequate healthcare access, and lower overall health status within the community.⁹⁸⁻¹⁰⁰ We would do well to adopt utilization of this metric both for research and clinical purposes, to identify and support patients who are likely falling through the cracks in our systems.

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Conflict of Interest

None declared.

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