Diversity, Equity, and Inclusion in Clinical Trials

Grace Keegan, BS[a], Angelena Crown, MD[b], Kathie-Ann Joseph, MD, MPH[c,d,*]

KEYWORDS

• Minority groups • Vulnerable populations • Diversity • Equity • Inclusion
• Clinical trials

KEY POINTS

- Despite higher cancer mortality rates, Black/African American patients are underrepresented in clinical trials.
- Representation in clinical trials varies across different races/ethnicities, sociodemographic status, and age groups.
- Physicians can play a role in improving clinical trial enrollent and retention among underrepresented groups.

INTRODUCTION

According to the American Cancer Society's report on the status of cancer disparities in 2021, the overall mortality rate from cancer in both Black men and women is significantly higher (19% and 12%, respectively) than in White men and women.[1] This reflects a difference in cancer mortality rates of 178.6 deaths per 100,000 people among non-Hispanic Blacks and 157.2 deaths per 100,000 people among non-Hispanic Whites. This is startling when weighed against the fact that overall rates of cancer are higher among non-Hispanic Whites (476.3 cases per 100,000 people) than non-Hispanic Blacks (459.0 cases per 100,000 people), Hispanics (354.3 cases per 100,000 people), and Asian/Pacific Islanders (308.3 cases per 100,000 people).[2] Black women, in particular, have an 8% lower incidence of cancer than White women despite these overall higher mortality rates.[1] The National Comprehensive Cancer Network (NCCN) maintains that clinical trials provide some of the best treatment options to eligible patients; as a result, ensuring equitable access and participation in

[a] Keegan-University of Chicago, Pritzker School of Medicine, 924 E. 57th Street, Chicago, IL 60637, USA; [b] Breast Surgery, True Family Women's Cancer Center, Swedish Cancer Institute, Seattle, WA, USA; [c] Department of Surgery, New York University Grossman School of Medicine, NYC Health and Hospitals/Bellevue, New York, NY, USA; [d] NYU Langone Health's Institute for Excellence in Health Equity, 180 Madison Avenue, New York, NY, USA
* Corresponding author. Department of Surgery, NYU Grossman School of Medicine, 424 East 34th Street, Kimmel Pavilion, KP-3 Room 3-102, New York, NY 10016.
E-mail address: Kathie-Ann.Joseph@nyulangone.org

Surg Oncol Clin N Am 32 (2023) 221–232
https://doi.org/10.1016/j.soc.2022.08.005
surgonc.theclinics.com

clinical trials across diverse populations is critical for reducing disparities in cancer outcomes.

When studying the benefits of a drug, the demographic composition of clinical trial enrollees should be proportional to the number of patients in each category (race, gender, and sexual identity) affected by the disease. Clinical trials have historically included a disproportionately low percentage of minority groups, although many of the cancers or subtypes targeted by the trial affect these populations at a greater rate, including triple-negative breast cancer (TNBC) in women and prostate cancer in men.[3] Expanding accessibility of clinical trials to proportionately include diverse patient populations has proved challenging as the range of clinical trials has expanded, and these disparities persist.

DISPARITIES AND ACCESSIBILITY OF CLINICAL TRIALS TO DIVERSE POPULATIONS

On both a national and international scale, the lack of racial and ethnic representation in clinical trials precludes the generalizability and effectiveness of applying clinical findings to these populations. Although approximately 40% of people in the United States identify as a racial or ethnic minority, one study describing the representation of minorities in oncology clinical trials from 2003 to 2016 found that people of color as a group represent only 14% of clinical trials participants.[4,5] Another report on clinical trials supporting the US Food and Drug Administration (FDA) approval of drugs in the year 2019 cited overall an inclusion of 8% Black/African American, 6% Asian, and 11% Hispanic or Latinx participants.[6] Although this is representative of the Asian population in the United States, these numbers underrepresent both the Black/African American population, which is 13.4% of the US population, and the Hispanic or Latinx population, which is 18.5% of the total.[7] For Black/African American populations specifically, this lack of representation has been particularly striking. In a review of FDA-approved proposals from 1997 to 2014, the median percentage of African and African American participants per trial ranged from 1.8% to 3.5%.[8] In pharmaceutical company-sponsored trials, there is a poor representation of Black patients on a similar scale, as only 2.9% of participants in these trials overall identified as African American or Black.[9]

The equity concerns implicated by these disparities are important to highlight, given that clinical trials often give patients an opportunity to treat their disease when other options have failed. Ensuring that members of racial and ethnic minority groups have access to clinical trials may help improve disparities in health outcomes and promote just distribution of health resources. In addition, one review found that 20% of drugs approved in clinical trials show different clinical responses across racial and ethnic groups. This finding underscores the importance of enrolling a diverse population of patients within clinical trials to better understand drug toxicity and efficacy across populations.[10]

Oncology clinical trials are no exception to this overall pattern. In a study of oncology trials since 2000, non-Hispanic Whites were more likely to be enrolled in trials, representing 120% of their percentage in the population overall, whereas Black/African American participants were represented at 70% and Hispanic or Latinx participants at 40% of their proportion of the overall population.[4] Another review of clinical trials leading to cancer drug approvals from 2008 to 2018 examined racial and ethnic representation in trial participants compared with demographic proportions in US cancer incidence and found that representation among Black patients was only 22% of expected, and representation among Hispanic patients was only 44% of expected. Asian patients were overrepresented in clinical trials when weighted to cancer incidence rates.[11]

These disparities are even more drastic in trials for particular cancers and drugs. Specifically, in immunotherapy trials, Black patients constitute less than 4% of patients enrolled.[12] A study in breast cancer clinical trial enrollment found that Black and Hispanic patients were significantly less likely to be aware of clinical trials than White patients.[13] A lack of knowledge of clinical trials prevents patients from actively seeking out trials or choosing to get care at an institution offering the trial, contributing to the disparities in trial enrollment that exist.

An illustrative example of this inequitable phenomenon is the recent Keynote 522 trial for TNBC. TNBC is highly aggressive and has few viable therapeutic options. Although TNBC comprises 15% of breast cancers in the United States, this rate is estimated to be twice as high among Black women and makes up 39% of breast cancers among premenopausal Black women.[14–16] Although TNBC is remarkably heterogeneous at the molecular level, it is typically associated with an aggressive clinical course, including higher rates of brain and lung metastases and shorter disease-free intervals compared with other subtypes.[17–19] The Keynote 522 study was a Phase III trial that showed improved disease-free survival with the addition of pembrolizumab to standard chemotherapy for high-risk early-stage TNBC.[20] Given the increased prevalence of TNBC among Black women and the high rate of side effects in the study, the fact that only 4.5% of trial participants were Black women is highly concerning and highlights the importance of recruiting underrepresented minorities into clinical trials. This level of representation of Black women in breast cancer trials is consistent with recent studies evaluating the Oncotype DX (Genomic Health) recurrence score, which is widely used to determine chemotherapy benefit in luminal type breast cancers. Indeed, Black women made up 4% of women in the recent TAILORx study, which provided data to support the omission of chemotherapy for women >50 years with mid-range recurrence scores.[21] Given that Black women have worse outcomes relative to White women at each recurrence score range and Black women were underrepresented in the studies that validated the recurrence score, it raises questions of whether the test is as accurate in estimating prognosis and predicting chemotherapy benefit for Black women with breast cancer.[22]

Disparities in clinical trial representation also exist within socioeconomic strata and across age groups. The Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System Survey found that higher income and lower age correlated with greater participation in cancer clinical trials from 2011 to 2021. Educational attainment, however, was not correlated with enrollment.[23] A study of gastrointestinal cancer surgical patients found patients with public health insurance were significantly less likely to participate in clinical trials.[24] In this study, Medicaid patients were 51% as likely to enroll in clinical trials than people with private insurance. The same trial identified interactions between race and income in clinical trial participation. Both high-income (odds ratio [OR] 0.67) and low-income (OR 0.75) Blacks were less likely to participate in clinical trials than low-income and high-income Whites.[25] Low income, and people of color, is more likely to get their health care at a community center where they are likely to receive their cancer diagnosis and treatment options. Cancer clinical trial enrollment at community centers is extremely low (7%). The national percentage of patients with cancer enrolled in clinical trials is already low at 8%, so the number of patients seeking care at community centers who have access to clinical trials is exceptionally small.[26] This presents a formidable structural barrier to trial enrollment for patients of low socioeconomic status (SES) with burdensome logistical challenges, including needing to travel large distances to access trials and receive investigational medications.

Linguistic minorities are also unrepresented in oncology clinical trials and may be misrepresented in trials that rely on patient-reported outcome measures (PROMs) for obtaining data. Indeed, one review of oncology trials reported that the majority of trials using a PROM as a primary endpoint did not offer trial materials with a validated Spanish or Chinese language translation.[27] Health literacy is known to be lower in ethnic minorities; moreover, limited knowledge of research opportunities or understanding of the consent process in linguistically diverse patients are implicated in the underrepresentation of this population among clinical trial participants.[28] Measures that assess the quality of informed consent in clinical trials are lower in patients with limited English proficiency (LEP).[29] Furthermore, requirements of English language competence in trial recruitment and factors of the research setting that foment mistrust of the consenting process have been identified as major barriers to recruitment of linguistically diverse populations.[30]

Finally, physician attitudes and structural racism also contribute to the low accessibility of oncology clinical trials to diverse populations. Physician attitudes about patient adherence to trial protocols were cited as a major inhibitor to offering trial enrollment opportunities to underrepresented populations in 61% of trials included in a systematic review.[31] These disparities in access to oncology clinical trials, which lead to inequitable enrollment, require intervention at individual and institutional levels.

Increasing Enrollment of Diverse Patient Populations

The persisting disparities within oncology clinical trial accessibility warrant further exploration into strategies for increasing enrollment of diverse patient populations. Here we will further explore misconceptions about trial enrollment in various underrepresented groups and identify strategies that have shown to be effective in increasing access and enrollment in these populations.

A perception of lack of interest and a higher rate of declining enrollment in clinical trials is often incorrectly cited as the cause of lower rates of participation of racial and ethnic minorities in clinical trials.[13] However, a breast cancer clinical trial patient survey found no significant difference in patient interest in trial participation or rates of patients declining to participate in clinical trials based on race or ethnicity.[13] Therefore, strategies for promoting enrollment of racial and ethnic minorities must focus on structural barriers to access trials rather than regarding it as a natural process of patient autonomy. These findings do not ignore the presence of trust barriers that exist in the relationship between racial and ethnic minorities and the health care system, related to historical exclusion and exploitation of these populations in the medical field.

An investigation into the recruitment of racial and ethnic minorities used an interventional mapping approach based on health behavior theories and conducting needs-assessments within specialty clinics and found this strategy to be an effective way for health centers to identify population-specific barriers and influence minority recruitment.[32] In addition, the multistakeholder approach has been suggested as an effective way to increase enrollment of racial and ethnic minorities given that referring physicians, trial sponsors, and trial coordinators or recruiters all play a large role in the enrollment of ethnic and racial minorities in studies.[33] Together, these studies suggest that strategies to increase enrollment of ethnic and racial minorities must be intersectional and based on the specific barriers identified within populations under-enrolled in clinical trials.

Increasing enrollment of linguistic minorities is very important given the increasing linguistic diversity in the US population. 21.5% of people living in the United States (67.8 million) speak a language other than English at home.[34] Enrollment of

linguistically diverse populations in clinical research currently requires special preparations indicated by many study sponsors and institutional review boards (IRBs). These requirements contribute to under-enrollment of these populations. IRBs should reduce unnecessary effort related to including patients with LEP in research.[35] Language barriers also bring to question the quality of informed consent and health literacy in patients with LEP. Therefore, enrollment of patients with LEP can only increase after better translation standards are developed to improve the transmission of high-quality information about health care, especially in providing consent for trials.[36] The use of multimedia tools that aim to improve linguistic and cultural inclusion in medical interactions and trial recruitment, such as animations, could also help increase enrollment for this population. This specific strategy also encourages patients to ask questions about health research and promotes a more thorough conversation about trials before consent and enrollment to protect this vulnerable population.[28]

Increasing the representation of patients of low SES in clinical trials is essential for improving equity in medical care. There are numerous requirements of the clinical trial identification and enrollment process that present barriers to patients of low SES, which contribute to the low rate of enrollment among these patients. Patients at community care centers are less likely to have doctors that offer clinical trial opportunities or are connected with academic medical centers. One study reported that 30% of patient responses to a survey question on barriers to participation involved logistical concerns related to low SES, including the inability to pay for childcare or transportation or to afford time off from work.[13] These barriers can also contribute to incomplete follow-up, which highlights the difficulties associated with both recruitment and retention of diverse populations in clinical trials. A randomized control trial studying preterm birth found that offering financial incentives, assistance with transportation, and supervised childcare services to all patients desiring to enroll resulted in proportionate follow-up rates across race and ethnicity, SES, and marital status.[37] Providing these services, which reduce the burden of enrollment, particularly for patients with low SES, should be more widely applied. Rural populations may also benefit from these improvements. Because SES and race/ethnicity are often associated, strategies to reduce this formidable barrier to clinical trial enrollment for already medically vulnerable populations can promote equity across multiple underrepresented groups.

Recognizing that most cancer-related clinical trials and research traditionally have been conducted in academic settings, yet 85% of patients with cancer receive their care in the community, the National Cancer Institute (NCI) has sponsored initiatives and programs for community-based clinical research and cancer trials such as the Community Clinical Oncology Program (CCOP), NCI Community Cancer Centers Program (NCCCP) and the NCI Community Oncology Research Program (NCORP). These programs support clinical trials and research in community-based settings. Although these programs have helped to promote diversity and access to clinical trials, there remain barriers to conducting trials in the community setting. Even with NCI support, funding remains an issue for these smaller programs and maintaining an adequate infrastructure to conduct cancer trials. More importantly, efforts need to be made to increase awareness of the importance of clinical trials at the hospital leadership level to support these efforts.

Elderly patients are the largest consumers of health care in the United States. Increasing age is the most significant risk factor associated with cancer incidence rates in the United States.[38] Consequently, drugs studied in clinical trials have the potential to provide significant benefits for this elderly population with complex health conditions. However, this population is largely underrepresented in clinical trials. This is often an effect of trial design, which often excludes elderly populations due

to concerns about comorbidities and toxicities. Most data on toxicity in clinical trials are reported up to the 75–80 age group, and with our aging population, this needs to be expanded.[39,40] Trial unavailability or ineligibility was reported as the major reason for non-enrollment in research for elderly patients, with 60% of respondents in this survey indicating this barrier.[41] The physician also plays a role in the underrepresentation of elderly patients. In a study on physician involvement in patient recruitment, a discussion about clinical trial participation was reported in interactions with 76% of eligible patients younger than 65 but only 58% of eligible patients over 65.[41] The poor understanding of response to treatment in older patients resulting from low enrollment in clinical trials is of high concern because these drugs are often prescribed to elderly patients.[42] It is imperative that clinical research leadership takes steps to improve the understanding of toxicity in older patients by enrolling more older patients in trials specifically focused on the elderly.

Sexual and gender minorities are particularly hard to reach for clinical trial recruitment and are consequently underrepresented in trial participants. Demographic information on sexual orientation and gender identity is often omitted from health care system data collection or results of clinical research.[43,44] Clinical trial sponsors and investigators should encourage the reporting of sexual orientation and gender identity, as patients are willing to disclose, to better understand the degree of underrepresentation of this population in trials. The application of a mobile app for engagement and recruitment of underrepresented populations, specifically sexual and gender minorities, has shown to be a cost-effective way of increasing the representation of this vulnerable population in clinical research.[45] Digital engagement strategies may help reduce stigma or avoid the effects of bias in interpersonal interactions with health care professionals. Further research should work to identify strategies for improving recruitment and retention in this population.

Greater enrollment of these underrepresented populations as a whole could be achieved through fundamental changes to clinical trial design. Clinical trial leadership should work to broaden and more universally apply recommendations published by the FDA that encourage the modernization of eligibility criteria. Critically evaluating and implementing more inclusive eligibility criteria, in turn, may prevent unnecessary exclusion of patients from trials and specifically address unfair criteria that particularly disadvantage minority populations.[26,46] Inclusion of patients with chronic conditions should be encouraged whenever possible, particularly in later phase trials in which existing therapies are being tested for new indications and safety has been established. Indeed, most trials that restrict eligibility based on language ability or chronic diseases often disproportionately exclude marginalized and minority patients.[13] Consequently, these measures may increase enrollment of various minority groups and greatly improve the generalizability of research findings as new drugs are often prescribed to patients with chronic comorbidities. Strategies that target underrepresented groups with multifaceted approaches have the highest potential to be effective.

Overcoming Barriers to Patient Enrollment

Barriers to enrollment of minority groups must be addressed in strategies to increase recruitment and retention of these populations. Both logistical barriers, including engagement with community-based health centers and integration of these centers with academic medical centers, and interpersonal barriers, including patient-provider trust and attitudes, are important considerations in clinical trial design. Efforts to overcome these barriers may be pursued from a system, individual provider, and patient-focused perspective.

Although strategies to address logistical barriers that offer financial reimbursement, transportation, and child care can effectively enroll and retain minority groups, a large percentage of patients from underrepresented minorities receive health care at community centers and cannot take advantage of these initiatives.[37] At the system level, strategies to increase engagement of community health centers in clinical trials have proven to be effective at targeting both racial and ethnic minorities, people of low SES, and people from rural communities. Basic community outreach performed by clinical trial personnel at community centers, churches, and neighborhood schools increases knowledge of trials in low-income and minority populations.[13] In addition, increasing awareness of clinical trials among community-based health providers is key to improving enrollment among underrepresented populations receiving care at community centers. Increased contact between community-based and academic center providers through a streamlined referral system can bridge the gap between trial access for these populations.[13]

Conducting substudies or developing a study arm in a specific geographic area or health center with a greater percentage of a target minority population that is difficult to recruit at main study centers can also be an effective way to engage these communities.[8] By designing online and printed clinical trial information at eighth-grade reading level or lower, researchers can make materials more accessible at community health centers.[13] Effectively engaging patients and providers at community-based health centers, when applied in combination with other strategies such as providing assistance with travel and childcare, may help to increase enrollment of these underrepresented populations.

It is also important that these strategies that target underrepresented populations are culturally sensitive and that providers set aside their biases and offer clinical trial enrollment to all eligible patients equitably. One study of oncology cancer trials found that when patients with cancer are offered the opportunity to participate in clinical trials, 50% do, yet only 8% of these eligible patients are enrolled.[47] Though these numbers may reflect some degree of logistical barriers, this finding also suggests that discrimination may play a role in the under-enrollment of underrepresented minority patients. Patients also look to their physicians as the key source for information about trials, above online resources, so it is crucial that doctors offer trials to all eligible patients.[48] Physicians can play a key role in reducing the knowledge barrier to enrollment for underrepresented patients.

At the level of the patient, some studies report that mistrust among ethnic minorities is commonly cited as a barrier to inclusion in research, and awareness of a history of unethical practices in the medical field contributes to low enrollment of these patients.[49] Other researchers have further explored this idea and found that beliefs about the institution of medicine as elitist and not truly committed to promoting health for vulnerable and ethnic minority communities contribute to mistrust.[50] Building trust between a patient and researcher becomes more natural when the individuals share a similar background, so recruiting more culturally diverse research coordinators and physicians is important for addressing this challenge.[51] Engagement within communities at health centers and the development of referral systems, as previously described, can also be an effective approach to establishing trust and overcoming trust barriers.[50,52] By working within already substantiated trust structures, study clinicians may efficiently reach patients who cannot access academic centers and promote a more just recruitment process in clinical research.

Improving Diversity and Equity of Clinical Trial Leaders

One of the strategies to improve enrollment and retention of patients from underrepresented minority groups is to improve the diversity of clinical trial leadership. Diversity is limited within oncology as a specialty. Indeed, in 2019, only 5.1% of radiation oncology faculty and 5.7% of medical oncology faculty registered on the Association of American Medical Colleges (AAMC) full-time Faculty Roster identified as Underrepresented in Medicine (URM).[10] Similarly, women made up 29.1% of radiation oncology faculty and 38.1% of medical oncology faculty in the same study.[53] Parallel trends are also present in surgical oncology.[54] This lack of diversity among medical faculty and leadership leads to poor recruitment of URM medical students and residents and propagates a vicious cycle of underrepresentation.[55–57]

Clinical trial leadership is also plagued by a lack of representation of women and physicians from URM backgrounds. Indeed, in a study assessing the gender of authors across 114 oncology randomized control trials, only 22.9% were women.[58] Furthermore, there was an even lower proportion of women steering committee members (20.3%), first authors (21.9%), and senior authors (10.3%). A second study assessing 598 Phase 3 therapeutic oncologic randomized clinical trials found that 17.9% of trials had a female senior author.[59] The highest rate of female senior author sites was seen in breast and head and neck cancer trials. In contrast, the lowest rates of female senior authorship were observed in gastrointestinal, genitourinary, and hematologic cancer trials. Interestingly, no female senior authors for surgical trials were identified.

In addition, structural barriers to access, fear, and mistrust of the medical establishment are thought to contribute to low clinical trial enrollment rates among URM patient. Investigator bias has also been reported, with some respondents to a qualitative interview reporting opinions that patients from ethnic and racial minorities are less promising clinical trial participants. Racial concordance has been associated with improved communication and health care utilization among patients with URM.[60–62] Involvement of URM investigators is also associated with higher rates of patient with URM enrollment and retention in clinical trials.[63–65] As a result, increasing leadership among URM oncology physicians and trial leaders would not only help to inspire the next generation of URM physicians but could also help to improve clinical trial enrollment of patients with URM.

SUMMARY

In summary, minority groups are vastly underrepresented in clinical trial participants and leadership. Because these studies provide innovative and revolutionary treatment options to patients with cancer and have the potential to extend survival, it is imperative that public and private stakeholders, as well as hospital and clinical trial leadership, prioritize equity and inclusion of diverse populations in clinical trial development and recruitment strategies. Achieving equity in clinical trials could be an important step in reducing the overall cancer burden and mortality disparities in vulnerable populations.

CLINICS CARE POINT

- Despite higher cancer mortality rates, Black/African American patients are underrepresented in clinical trials.

- Representation in clinical trials varies across different races/ethnicities, sociodemographic status, and age groups.
- Physicians can play a role in improving clinical trial enrollent and retention among underrepresented groups.

DISCLOSURE

The authors have nothing to disclose.

REFERENCES

1. Islami F, Guerra CE, Minihan A, et al. American Cancer Society's report on the status of cancer disparities in the United States, 2021. CA Cancer J Clin 2022;72(2):112–43.
2. SEER Cancer Statistics Review, 1975-2017. National Cancer Institute SEER. Available at: https://seer.cancer.gov/csr/1975_2017/index.html. Accessed April 18, 2022.
3. Cancer Disparities in the Black Community. Am Cancer Soc. Available at: https://www.cancer.org/about-us/what-we-do/health-equity/cancer-disparities-in-the-black-community.html. Accessed April 18, 2022.
4. Duma N, Vera Aguilera J, Paludo J, et al. Representation of minorities and women in oncology clinical trials: review of the past 14 years. J Oncol Pract 2018;14(1):e1–10.
5. Bureau. National Population by Characteristics: 2010-2019. United States Census Bureau. Available at: https://www.census.gov/data/tables/time-series/demo/popest/2010s-national-detail.html. Accessed April 18, 2022.
6. 2019 Drug Trials Snapshots Summary Report. US Food & Drug Administration, Available at: https://www.fda.gov/drugs/drug-approvals-and-databases/drug-trials-snapshots Accessed April 18, 2022.
7. U.S. Census Bureau QuickFacts: United States. United States Census Bureau. Available at: https://www.census.gov/quickfacts/US. Accessed April 18, 2022.
8. Knepper TC, McLeod HL. When will clinical trials finally reflect diversity? Nature, 557(7704), 2018, 157-159.
9. Unger JM, Hershman DL, Osarogiagbon RU, et al. Representativeness of Black patients in cancer clinical trials sponsored by the National Cancer Institute compared with pharmaceutical companies. JNCI Cancer Spectr 2020;4(4). pkaa034.
10. Ramamoorthy A, Pacanowski MA, Bull J, et al. Racial/ethnic differences in drug disposition and response: review of recently approved drugs. Clin Pharmacol Ther 2015;97(3):263–73.
11. Loree JM, Anand S, Dasari A, et al. Disparity of race reporting and representation in clinical trials leading to cancer drug approvals from 2008 to 2018. JAMA Oncol 2019;5(10):e191870.
12. Nazha B, Mishra M, Pentz R, et al. Enrollment of racial minorities in clinical trials: old problem assumes new urgency in the age of immunotherapy. Am Soc Clin Oncol Educ Book 2019;39:3–10.
13. Trant AA, Walz L, Allen W, et al. Increasing accrual of minority patients in breast cancer clinical trials. Breast Cancer Res Treat 2020;184(2):499–505.

14. Amirikia KC, Mills P, Bush J, et al. Higher population-based incidence rates of triple-negative breast cancer among young African-American women: implications for breast cancer screening recommendations. Cancer 2011;117(12):2747–53.
15. Carey LA, Perou CM, Livasy CA, et al. Race, breast cancer subtypes, and survival in the Carolina Breast Cancer Study. JAMA 2006;295(21):2492–502.
16. Kohler BA, Sherman RL, Howlader N, et al. Annual Report to the Nation on the Status of Cancer, 1975-2011, Featuring Incidence of Breast Cancer Subtypes by Race/Ethnicity, Poverty, and State. JNCI J Natl Cancer Inst 2015;107(6): djv048.
17. Boyle P. Triple-negative breast cancer: epidemiological considerations and recommendations. Ann Oncol 2012;23:vi7–12.
18. Dawood S. Triple-negative breast cancer: epidemiology and management options. Drugs 2010;70(17):2247–58.
19. Hudis CA, Gianni L. Triple-negative breast cancer: an unmet medical need. Oncologist 2011;16(Suppl 1):1–11. https://doi.org/10.1634/theoncologist.2011-S1-01.
20. Schmid P, Cortes J, Dent R, et al. Event-free survival with pembrolizumab in early triple-negative breast cancer. N Engl J Med 2022;386(6):556–67.
21. Sparano JA, Gray RJ, Makower DF, et al. Adjuvant chemotherapy guided by a 21-gene expression assay in breast cancer. N Engl J Med 2018;379(2):111–21. https://doi.org/10.1056/NEJMoa1804710.
22. Collin LJ, Yan M, Jiang R, et al. Oncotype DX recurrence score implications for disparities in chemotherapy and breast cancer mortality in Georgia. NPJ Breast Cancer 2019;5:32.
23. Meyer S, Woldu HG, Sheets LR. Sociodemographic diversity in cancer clinical trials: New findings on the effect of race and ethnicity. Contemp Clin Trials Commun 2021;21:100718.
24. Abbas A, Diaz A, Obeng-Gyasi S, et al. Disparity in clinical trial participation among patients with gastrointestinal cancer. J Am Coll Surg 2022;234(4):589–98.
25. Parekh T, Desai A. Demographic and socioeconomic disparities among cancer survivors in clinical trials participation, USA, 2016–2018. J Cancer Educ 2020; 37(1):80–90.
26. Unger JM, Vaidya R, Hershman DL, et al. Systematic review and meta-analysis of the magnitude of structural, clinical, and physician and patient barriers to cancer clinical trial participation. JNCI J Natl Cancer Inst 2019;111(3):245–55.
27. Grant SR, Noticewala SS, Mainwaring W, et al. Non-English language validation of patient-reported outcome measures in cancer clinical trials. Support Care Cancer 2020;28(6):2503–5.
28. George S, Moran E, Duran N, et al., Using animation as an information tool to advance health research literacy among minority participants, AMIA Annu Symp Proc, 2013, 2013, 475-484.
29. Hunt LM, de Voogd KB. Are good intentions good enough?: Informed consent without trained interpreters. J Gen Intern Med 2007;22(5):598–605.
30. anne Hughson J, Woodward-Kron R, Parker A, et al. A review of approaches to improve participation of culturally and linguistically diverse populations in clinical trials. Trials 2016;17(1):1–10.
31. Howerton MW, Gibbons MC, Baffi CR, et al. Provider roles in the recruitment of underrepresented populations to cancer clinical trials. Cancer Interdiscip Int J Am Cancer Soc 2007;109(3):465–76.

32. Amorrortu RP, Arevalo M, Vernon SW, et al. Recruitment of racial and ethnic minorities to clinical trials conducted within specialty clinics: an intervention mapping approach. Trials 2018;19(1):115.
33. Clark LT, Watkins L, Piña IL, et al. Increasing diversity in clinical trials: overcoming critical barriers. Curr Probl Cardiol 2019;44(5):148–72.
34. Census - Social Characteristisc in the United States. United States Census Bureau. Available at: https://data.census.gov/cedsci/table?tid=ACSDP5Y2020.DP02&hidePreview=true. Accessed April 18, 2022.
35. Glickman SW, Ndubuizu A, Weinfurt KP, et al. Perspective: the case for research justice: inclusion of patients with limited English proficiency in clinical research. Acad Med 2011;86(3):389–93.
36. Michael J, Aylen T, Ogrin R. Development of a Translation Standard to support the improvement of health literacy and provide consistent high-quality information. Aust Health Rev 2013;37(4):547–51.
37. Webb DA, Coyne JC, Goldenberg RL, et al. Recruitment and retention of women in a large randomized control trial to reduce repeat preterm births: the Philadelphia Collaborative Preterm Prevention Project. BMC Med Res Methodol 2010;10(1):1–15.
38. Risk factors: age - national cancer Institute. National Cancer Institute; 2015. Available at: https://www.cancer.gov/about-cancer/causes-prevention/risk/age. Accessed April 18, 2022.
39. Hurria A, Togawa K, Mohile SG, et al. Predicting chemotherapy toxicity in older adults with cancer: a prospective multicenter study. J Clin Oncol 2011;29(25):3457–65.
40. Palaia I, Loprete E, Musella A, et al. Chemotherapy in elderly patients with gynecological cancer. Oncology 2013;85(3):168–72.
41. Javid SH, Unger JM, Gralow JR, et al. A prospective analysis of the influence of older age on physician and patient decision-making when considering enrollment in breast cancer clinical trials (SWOG S0316). Oncologist 2012;17(9):1180–90.
42. Kemeny MM, Peterson BL, Kornblith AB, et al. Barriers to clinical trial participation by older women with breast cancer. J Clin Oncol 2003;21(12):2268–75.
43. Grasso C, McDowell MJ, Goldhammer H, et al. Planning and implementing sexual orientation and gender identity data collection in electronic health records. J Am Med Inform Assoc 2019;26(1):66–70.
44. Heck NC, Mirabito LA, LeMaire K, et al. Omitted data in randomized controlled trials for anxiety and depression: A systematic review of the inclusion of sexual orientation and gender identity. J Consult Clin Psychol 2017;85(1):72.
45. Lunn MR, Capriotti MR, Flentje A, et al. Using mobile technology to engage sexual and gender minorities in clinical research. PLoS One 2019;14(5):e0216282.
46. Kim ES, Bruinooge SS, Roberts S, et al. Broadening eligibility criteria to make clinical trials more representative: American Society of Clinical Oncology and Friends of Cancer Research Joint Research Statement. J Clin Oncol 2017;35(33):3737.
47. Unger JM, Hershman DL, Till C, et al. "When offered to participate": a systematic review and meta-analysis of patient agreement to participate in cancer clinical trials. JNCI J Natl Cancer Inst 2021;113(3):244–57.
48. Sood A, Prasad K, Chhatwani L, et al. Patients' attitudes and preferences about participation and recruitment strategies in clinical trials, Mayo Clinic Proc, 2009;84(3):243–247.
49. Moreno-John G, Gachie A, Fleming CM, et al. Ethnic minority older adults participating in clinical research. J Aging Health 2004;16(5_suppl):93S–123S.

50. Curry L, Jackson J. Recruitment and retention of diverse ethnic and racial groups in health research: An evolving science. In: Curry L, Jackson J, editors. The science of inclusion: Recruiting and retaining racial and ethnic elders in health research. Washington, DC: Gerontological Society of America; 2003. pp. 1–7
51. Vesey GA. Recruitment and retention of minority elders in health-related research: A community-based approach. Sci Incl Recruit Retaining Racial Ethn Elders Health Res Wash DC Gerontol Soc Am 2003;82(9):82–9.
52. McDougall GJ Jr, Simpson G, Friend ML. Strategies for research recruitment and retention of older adults of racial and ethnic minorities. J Gerontol Nurs 2015; 41(5):14–23.
53. Kamran SC, Niemierko A, Deville C, et al. Diversity Trends by Sex and Underrepresented in Medicine Status Among US Radiation and Medical Oncology Faculty Over 5 Decades. JAMA Oncol 2022;8(2):221–9.
54. Yu AYL, Iwai Y, Thomas SM, et al. Diversity among surgical faculty, residents, and oncology fellows from 2011/2012 to 2019/2020. Ann Surg Oncol 2022;29(5): 2763–5.
55. Price EG, Gozu A, Kern DE, et al. The role of cultural diversity climate in recruitment, promotion, and retention of faculty in academic medicine. J Gen Intern Med 2005;20(7):565–71.
56. West MA, Hwang S, Maier RV, et al. Ensuring equity, diversity, and inclusion in academic surgery: an American Surgical Association white paper. Ann Surg 2018; 268(3):403–7.
57. Rodríguez JE, Campbell KM, Mouratidis RW. Where are the rest of us? Improving representation of minority faculty in academic medicine. South Med J 2014; 107(12):739–44.
58. Muquith M, Pham T, Espinoza M, et al. Representation of investigators by gender among authors of phase 3 oncology trials worldwide. JAMA Netw Open 2022; 5(2):e220031.
59. Ludmir EB, Mainwaring W, Miller AB, et al. Women's representation among lead investigators of clinical trials in oncology. JAMA Oncol 2019;5(10):1501–2.
60. Saha S, Komaromy M, Koepsell TD, et al. Patient-physician racial concordance and the perceived quality and use of health care. Arch Intern Med 1999; 159(9):997–1004.
61. Shen MJ, Peterson EB, Costas-Muñiz R, et al. The effects of race and racial concordance on patient-physician communication: a systematic review of the literature. J Racial Ethn Health Disparities 2018;5(1):117–40.
62. Laveist TA, Nuru-Jeter A. Is doctor-patient race concordance associated with greater satisfaction with care? J Health Soc Behav 2002;43(3):296–306.
63. Corbie-Smith G, Thomas SB, Williams MV, et al. Attitudes and beliefs of African Americans toward participation in medical research. J Gen Intern Med 1999; 14(9):537–46.
64. Corbie-Smith G, Thomas SB, St George DMM. Distrust, race, and research. Arch Intern Med 2002;162(21):2458–63.
65. Branson RD, Davis K, Butler KL. African Americans' participation in clinical research: importance, barriers, and solutions. Am J Surg 2007;193(1):32–9. https://doi.org/10.1016/j.amjsurg.2005.11.007 [discussion: 40].