

Race and Ethnicity in Cardiac Surgery: A Missed Opportunity?



Lina A. Elfaki, MSc, HBSc,¹ Akachukwu Nwakoby, BHSc,¹ Melanie Keshishi, BHSc, MBDC,¹ Dominique Vervoort, MD, MPH,^{2,3,4} Bobby Yanagawa, MD, PhD,^{1,2} and Stephen E. Fremes, MD, MSc^{3,4}

ABSTRACT

BACKGROUND Patients' race and/or ethnicity are increasingly being associated with differential surgical access and outcomes in cardiac surgery. However, deriving evidence-based conclusions that can inform surgical care has been difficult because of poor diversity in study populations and conflicting research methodology and findings. Using a fictional patient example, this review identifies areas of concern in research engagement, methodology, and analyses, as well as potential steps to improve race and ethnicity considerations in cardiac surgical research.

METHODS A narrative literature review was performed using the PubMed/MEDLINE and Google Scholar databases, with a combination of cardiac surgery, race, ethnicity, and disparities keywords.

RESULTS Less than half of the published cardiac surgery randomized control trials report the race and/or ethnicity of research participants. Racial and/or ethnic minorities make up <20% of most study populations and are significantly underrepresented relative to their proportions of the general population. Further, race and/or ethnicity of research participants is variably categorized based on ancestry, geographic regions, cultural similarities, or minority status. There is growing consideration of analyzing interrelated and confounding variables, such as socioeconomic status, geographic location, or hospital quality, to better elucidate racial and/or ethnic disparities; however, intersectionality considerations remain limited in cardiac surgery research.

CONCLUSIONS Racial and/or ethnic disparities are increasingly being reported in research engagement, cardiac pathologies, and surgical outcomes. To promote equitable surgical care, tangible efforts are needed to recruit racially and/or ethnically minoritized patients to research studies, be transparent and consistent in their groupings, and elucidate the impact of their intersectional social identities.

(Ann Thorac Surg 2024;117:714-22)

© 2024 by The Society of Thoracic Surgeons. Published by Elsevier Inc.

A 55-year-old woman of North African descent presents to the emergency department with multivessel coronary artery disease with moderate left ventricular systolic dysfunction that requires surgical revascularization. Should her social identity, including racial and ethnic descent, be considered to determine her operative risk? If it were to be considered, would her outcomes approach those reported of all White or non-White patients or be most similar to specifically African, African American, or Arab patients?¹

There is increasing recognition that race and ethnicity can impact the access to and outcomes of cardiac surgery. A risk-adjusted meta-analysis conducted by Benedetto and associates¹ demonstrated that Black patients have significantly greater risk-adjusted death after

coronary artery bypass grafting (CABG) compared with White patients. Disparities across race and/or ethnicity exist as a result of historic discrimination, mistrust in health care, and associated social determinants of health, including socioeconomic status, education, health literacy, and geographic location.²⁻⁴ It is possible that racial and/or ethnic disparities are partially a product of distinct biological predisposition.⁵ The “nature vs nurture” frameworks have led to centuries-old debates, with rising interest among cardiac surgery studies.⁵ However, biological characteristics are only one part of the access and outcomes equation. High-quality research that is accurate and representative of the general population is needed to provide evidence-based surgical care. Therefore, this review seeks to elucidate

¹Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada; ²Division of Cardiac Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada; ³Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada; and ⁴Division of Cardiac Surgery, Sunnybrook Health Sciences Centre, University of Toronto, Toronto, Ontario, Canada

Address correspondence to Dr Fremes, Schulich Heart Centre, Sunnybrook Health Sciences Centre, University of Toronto, 2075 Bayview Ave, Rm H4 05, Toronto, Ontario, Canada M4N 3M5; email: stephen.fremes@sunnybrook.ca.

various issues that surround the study of racial and/or ethnic disparities in the cardiac surgical literature and proposes multiple approaches to addressing them.

MATERIAL AND METHODS

LITERATURE REVIEW. A narrative literature review was performed searching the PubMed/MEDLINE and Google Scholar databases using a combination of variations of cardiac surgery, race, ethnicity, and disparities keywords. We critically reviewed the identified literature with regard to definitions of race and ethnicity, participant categorization, researcher-participant relations, and confounding variables.

DEFINING RACE, ETHNICITY, AND INTERSECTIONALITY. The American Psychological Association defines *race* as “physical differences that groups and cultures consider socially significant.” *Ethnicity* refers to “shared culture, such as language, ancestry, practices, and beliefs.”⁶ Broadly speaking, race refers to physical traits, often thought to be innate, that are used to define racial categories and are primarily related to nature. Ethnicity is more connected to nurture, capturing cultural identity and heritage that is learned or developed through socialization. Nurture can have secondary biological consequences, because the experiences and environmental exposures can impact physical health, development, and biological processes. Ultimately, both race and ethnicity are shaped by both nature and nurture, with each having its unique emphasis. Despite this semantic difference, race and ethnicity are sometimes used interchangeably.^{2,3}

Intersectionality is a theoretical framework that aims to recognize the impact of interrelated social factors on marginalized individuals.^{7,8} Social determinants of health, such as socioeconomic status, gender, and education, are interlinked and compound with race and/or ethnicity in a unique manner when it comes to patients’ identity, lifestyle, and health outcomes.⁸ Rather than studying isolated predisposing factors, an intersectional lens would call for analyses of multiple compounding factors.

PROPOSED SOLUTIONS. The study of race and ethnicity in cardiac surgery is a developing research niche. Solutions based on our lived experiences and expert opinions surrounding research methodology and promotion of race and ethnic diversity and justice are proposed to address any identified issues. These were also informed and corroborated by historical, sociological, genetic, and other medical literature on race and ethnicity.

STATEMENT OF POSITIONALITY. We recognize the importance of power and privilege in interpreting and commenting on issues surrounding race and ethnicity. We identify as being from African, European, and East

Asian descent. We recognize our positionality as settlers in Canada and the responsibility of honoring and respecting the land we live on, the resources that made this work possible, and the autonomy and sovereignty of Indigenous Peoples and other marginalized communities who were not involved in the research and writing process for this review. Our social identities may influence the perspective with which we studied the literature, wrote this review, and proposed research considerations and future directions to the field.

RESULTS

Increasingly, studies are exploring the impact of patients’ race and ethnicity on their surgical care. However, various challenges limit the reliability of the study methodology and findings and prevent surgeons from deriving evidence that informs clinical practice. These issues need to be addressed such that more intentional efforts can be made to promote research participant diversity, researcher-participant relations and communication, and analysis of intersectionality. Identifying disparities and gaps in research and clinical practice is how the field can move forward toward proposing systemic solutions to alleviate them and provide surgical care that is comprehensive, evidence-based, safe, and patient-centered.

PROBLEM 1: LACK OF RACIAL/ETHNIC DIVERSITY IN STUDY POPULATIONS. There is a paucity of racially and ethnically diverse participant enrollment in cardiac surgery research.^{4,9} Cancelli and associates⁹ found that only 9 of 51 cardiac surgery randomized controlled trials published from 2000 to 2020 reported race. Of those that reported, only 11.2% of patients identified with racialized and minoritized populations. This is despite racial minorities making up nearly 40% of the population of the United States (US).⁹ Furthermore, Preventza and associates⁴ reviewed cardiovascular trials from 1998 to 2017 and found that 43% of studies reported participants’ race and that just 4% of the participants in these studies were African American and 11% Hispanic, despite making up 14% and 19% of the USs population, respectively.¹⁰ By contrast, Asian individuals were overrepresented at 10% (compared with 6.1% of the US population).^{4,10} Research design limitations, including restrictive eligibility criteria, implicit and explicit language requirements, and limited enrollment outreach to marginalized racial and ethnic communities and community hospitals contribute to this disparity.¹¹ Additionally, patients from minoritized populations may be reluctant to participate in research studies due to a lack of trust in the health care professionals, lack of comfort with the study process, and stigma of participating.⁴ Addressing

the underlying issues in a clear, targeted, and systematic way may help increase the diversity of patient populations in cardiac surgery research.

Proposal 1: Diverse Research Teams. When research teams are constructed, including research leaders and collaborators from local communities that participants racially and/or ethnically identify with can help minorities feel more comfortable engaging in research.^{12,13} Such researchers have similar experiences navigating the health care system and can understand the unique barriers, develop rapport, and gain much-needed trust.¹⁴ In clinical practice, studies have found that patients with physicians of concordant race and/or ethnicity sought health care services more often, had improved outcomes, and reported greater satisfaction.¹⁵⁻¹⁹ Bias, whether implicit or explicit, from patients and physicians is hypothesized to underlie disparities in patient outcomes.¹⁵⁻¹⁹ Therefore, to accomplish racial and/or ethnic concordance in research avenues, focused programs from institutions and professional societies to promote academic research among racially and/or ethnically diverse clinicians and health care workers will be required.

Significant efforts have been undertaken recently by The Society of Thoracic Surgery and the American Association for Thoracic Surgery to foster diversity in the cardiothoracic surgical workforce through scholarships and mentorship programs.^{20,21} As well, these societies are funding ethics-based research and advocacy in the field that promote discussion and interventions for social disparities.

Proposal 2: Targeted Participant Recruitment. One technique to recruit underrepresented participants is snowball sampling. This is a form of participant recruitment that was inspired by the public health contact tracing model, where an individual from a particular community is identified (the source). That individual then draws on their personal connections in their social network to recruit other individuals with similar characteristics.²² This approach has been shown to garner a large population of diverse underrepresented participants in a short time with minimal cost.²² Furthermore, because the participants are being recruited by a member of the local community, the source can use their cultural understanding to appropriately cluster participants.²² For instance, a member of the Black or African community may be able to distinguish between different African ethnicities, Black Caribbean ethnicities, and African American groups. This could be particularly useful when increasing transparency in study population enrollment and the generalizability of the results. One drawback of this method of recruitment is that the sample generated is not random.²²

Proposal 3: Mandates From Funding Agencies. Many research agencies have already taken steps to incorporate principles of equity, diversity, and inclusion into their operation.²³ What grant-funding agencies incentive will ultimately happen. The National Institutes of Health requires all awardees to report deidentified individual-level study participant data with regard to race and ethnicity during enrollment in annual progress reports.²⁴

In Canada, funding agencies, such as the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada, and the Social Sciences and Humanities Research Council, are implementing racial and ethnic diversity of participants as part of their selection criteria. This is in keeping with the overall goals of funding agencies to support research that improves the health of the communities that they serve.²⁵ For example, CIHR has an Anti-Racism External Advisory Committee that addresses systemic racism in CIHR funding through an action plan formed with the help of racialized individuals in the research community and those with expertise.²⁶ The Social Sciences and Humanities Research Council has established an Indigenous research statement of principles that stresses the value of Indigenous knowledge systems and perspectives.²³ Given the historical significance of elevating the Indigenous identity, other research agencies are encouraged to adopt similar statements of principles.

In the US, the Food and Drug Administration has been urging for and providing voluntary guidance to promote diversity of participant recruitment since 1985.¹¹ The next steps may be for agencies to create grants that require race and ethnic diversity of research teams as well as applicants to come from organizations with formal research mentorship for underrepresented racial and ethnic groups.

PROBLEM 2: AVOIDING FURTHER HARM TO RACIAL/ETHNIC MINORITIES. The American Medical Association (AMA) *Manual of Style: A Guide for Authors and Editors* reminds us that “caution must be used when the race concept is described in health-related research.”^{27,28} Racially and/or ethnically minoritized populations have been the subject of traumatizing research studies and medical procedures, and, therefore, care must be taken when soliciting such information from patients.^{13,29} Indeed, the use of race-based data has led to medical discrimination against certain minoritized populations in notable instances.^{13,29,30} For example, certain groups, such as the African American community, have experienced racism in the past stemming from unethical research such as the Tuskegee syphilis study.¹³ According to Kraft and colleagues,¹³ personal and group experiences of racism with regard to

biomedical research and clinical care can negatively affect a patient's willingness to trust researchers.

Proposal 1: Clear, Consistent, and Respectful Communication. When race and/or ethnicity of patients is collected, clear and consistent communication with participants is vital to reinforce the priority of their health and comfort, appreciate their efforts, and highlight the impact of the findings.³¹ Recruiting diverse research staff and then training them on respectful and culturally appropriate interactions will improve diverse patient recruitment.³¹ This is particularly important for patients who may have reservations about participating in research studies given previous negative experiences that they or their communities may have encountered. The aim is to adequately convey to participants through communications and tangible actions that the purpose of identifying such disparities, whether of genetic or social etiology, is to personalize surveillance and disease interventions approaches to patients based on their needs.³¹

Proposal 2: Patient Partnerships. When cardiac surgery research is formulated and conducted, patient partnerships involving racially and ethnically minoritized patients should be incorporated. Patient partnerships are defined as patients, their families, and caregivers that are not consented study participants but are instead contributing members of the research team.³² These patient partners actively collaborate with researchers and contribute leadership across certain research practices.³² They are different from general patient engagement because rather than a unilateral flow of information where researchers implement the views of patients into the research design, they provide a bidirectional flow of information where both the researchers and the patients cooperate and make research decisions.³³ This follows the notion of "nothing about us without us" that, in the research context, aims to avoid research studies on minority patients being conducted by researchers who are not part of these communities.³⁴ Patient partners are involved in deriving the research questions that are relevant to minority patient populations and ensure that the research process and its outcomes are ultimately patient centered.³⁵ This is anticipated to reduce any possible harm to racially and/or ethnically minoritized individuals enrolled in cardiac surgery research.³⁵

It is important to note that the approach to addressing barriers to conducting racially diverse research through patient partnerships should be specific and nuanced. The approach should take into consideration the cultural differences and sensitivities of different communities rather than taking a one-size-fits-all approach. The solutions and strategies used to address barriers should be

carefully crafted and tailored to the unique experiences and perspectives of each community. This requires a deeper understanding of the cultural dynamics at play and an approach that is culturally sensitive, respectful, and mindful of the specific challenges faced by different communities.^{32,33,35} Nevertheless, tailoring research strategies to each community may prove challenging for statistical analyses. As a result, a balance must be struck between highly tailored and broader strategies to ensure feasible research design.

PROBLEM 3: LACK OF CONSISTENCY IN RACIAL/ETHNIC CATEGORIZATION. A major contributing factor to the difficulty in applying the findings of race-based studies to the clinical environment stems from the failure of such studies to thoroughly and candidly report how patients are classified into racial groups.³⁶⁻⁴⁰ For our fictional North African patient in the introduction, studies may categorize her as "non-White," "ethnic minority," "Black," "African American," "person of color," or "Arab," all of which may refer to biologically and culturally distinct populations. Such variable terms have been used in studies of CABG published in the past 2 years.³⁶⁻³⁹

This issue is not limited to cardiac surgical literature. In the 10 top-ranking academic journals in each of general medicine, surgery, and oncology between 2007 and 2018, race and/or ethnicity was a key part of the study design of 31.86% of the publications.⁴¹ Even though 81 different race and/or ethnicity classifications were identified, only 1.25% of articles described the method the authors used to classify individuals into racial/ethnic groups.⁴¹

The International Committee of Medical Journal Editors recommends that "authors should define how they determined race or ethnicity and justify their relevance."⁴² That is to address the issue that how individuals may be racially categorized in one geographic region may not be the same elsewhere. A North African person may be considered White passing in one country or region, but Black elsewhere. Although these terms may refer to groups that share similar outward facial and/or physical features, they still often refer to people with demographic differences, including geographic location, socioeconomic status, and biological differences, including ancestry and genetics.⁴³ Additionally, lumping people based on their continent of origin, despite distinctly different ethnicities, cultures, and genetic tendencies, as is done with "East and South Asians" or with "North, West, and East Africans," limits the power of the study.

As a result, conflicting findings are described in the literature for various cardiac surgical procedures. Rumsfeld and associates,⁴⁴ for example, found no

significant differences in overall risk-adjusted mortality at 30 days or 6 months for African American patients undergoing CABG compared with White patients. However, Enumah and associates⁴⁵ found that Black patients have higher odds of 30-day mortality compared with White patients after CABG. Alongside other differences in study methodology, patient demographics, and clinical context, how much the race and/or ethnicity of the patient population contributes to these differences is unclear, given the lack of explicit breakdown of the make-up of patients categorized as Black in the second study (eg, African American, Caribbean, North African, or biracial patients). Therefore, it would be challenging for a physician to determine whether the second study's findings are more applicable to their African American patient in clinic than the first.

Similarly, conflicting findings have also been described in aortic research. A study by Goodney and associates⁴⁶ reported similar mortality for Black and White patients undergoing thoracic endovascular aortic repair, whereas another study by Yin and associates⁴⁷ demonstrated better survival in 1 year after thoracic endovascular aortic repair for Black patients compared with White patients.

Admittedly, the implementation of standardized definitions of race across all research groups and across nations is not feasible. Indeed, discussion about how research studies determine, report, and analyze racial and ethnic grouping has been a historically controversial and ever-evolving topic.^{5,27} Therefore, alternative measures are needed to ensure findings can be meaningfully translated to the clinical setting.

Proposal: Transparency and Consistency in Groupings. Given the challenges with deriving standardized racial groupings worldwide, we can only begin to understand and, consequently, address racial and ethnic disparities in cardiac surgery with increased consistency and transparency regarding groupings.²⁶ For instance, knowing how studies identified patients as “non-White” or “Black” may help translate research findings to practice. This will require a concerted effort by our field at various levels, including institutional administrations, individual surgeon-researchers, and academic journals. Hospital and research staff will need to collect accurate information in a format that is conducive to research design, and academic journal review boards need to be vigilant about how findings relevant to race and/or ethnicity are reported and analyzed.²⁷ Here, a balance needs to be sought between generalizable evidence generation (ie, sample sizes and study power) and personalized approaches tailored to individuals' unique multitude of intersecting identities.

A limitation of note remains that when reporting race and ethnicity in research, the more precise the patient

groupings, the smaller the size of the subgroups may be, ultimately reducing the precision of the result or the power of the study. This limitation is of particular relevance to randomized controlled trials, because observational studies may use larger-scale data.

PROBLEM 4: DATA COLLECTION—HOW TO CATEGORIZE PATIENTS.

The AMA and International Committee of Medical Journal Editors state that there are inherent differences in how racial categories are defined, depending largely on the region or the context.^{27,42} This points to the diverse and intermixed geographic, ancestral, national, and cultural identity of patients and study participants that impedes the rigid universal categorization of discrete groups. For instance, not all Black people are African or African American in origin. East European, Middle Eastern, and North African people all may be considered White by some even though they face complex and distinct political disparities and systemic racism. The patient from the case study may be “White-passing” in physical features but identify as Black or African, especially if she is biracial.⁴⁸ Vice versa, she may have “African” features but identify as Arab or Middle Eastern. Indeed, whether race is to be self-reported by the participants or administratively is often a question raised by researchers and is another issue among the many that arise when the classification for race is vague.⁴⁸

Proposal 1: Self-Reported Race and Ethnicity. When race and ethnicity are self-reported, participants are given complete autonomy. In this method, patient participants are empowered to represent their perception of one aspect of their identity and how they engage with the health care system. This is essential, because some patients confront negative stereotypes in relation to their identity, which can strain the patient-provider relationship and result in impaired communication, poor adherence, and avoidance of health care.⁴⁹ For example, if an African American patient feels anxious about encountering negative stereotypes surrounding her race and/or ethnicity, she may misunderstand or fail to recall important information about her treatment plan.⁴⁹

Giving patients the option to self-report their race is just one way to return control to patients. Additional advantages of self-reported data include being able to reach participants across a wide geographic area through questionnaires or surveys if researchers will not have any in-person contact with participants. It also avoids any bias that may come from a research administrator trying to guess a patient's race and/or ethnicity based on their physical presentation when a patient was not able to or provided the opportunity to self-report.

However, for retrospective studies where race has already been assigned by an administrator, attaining self-reported data may not be feasible. Moreover,

whether self-reporting has occurred is not always clear, especially in larger databases. Furthermore, depending on societal experiences and family upbringing, 2 multi-racial individuals who are similar in racial make-up may identify strongly with different races.⁴⁸

Proposal 2: Researcher-Assigned Race and Ethnicity. An alternative to self-reporting, although less optimal, is race/ethnicity assigned by a research administrator (ie, not self-defined). This method may be more consistent because the criteria for belonging to a racial group are determined by one/few individual(s). However, various studies have sought to examine how concordant researcher-assigned measures of race are with self-reported race. A US-based study found that patients who self-identified as White or Black were also identified as such in researcher-assigned data.⁵⁰ However, there were many more inconsistencies between self-reported and administrative measures of race for patients who identified as Asian, Hispanic, or American Indian.⁵⁰ This highlights how a researcher administrator's subjectivity may introduce bias to the study.

PROBLEM 5: SOCIAL VS BIOLOGICAL DISPARITIES. As the *AMA Manual of Style* states, "like gender, race and ethnicity are cultural constructs, but they can have biological implications."^{27,28} In an increasingly diverse and interconnected world, patients are becoming more interconnected in their biological makeup, challenging the notion that individuals from the same race and/or ethnic group have similar biology. Genome-wide association studies have reported on variants of distinct genes that are increasingly expressed in Black patients and are associated with increased risk of left ventricular hypertrophy (*NCAM1*), heart failure (*TTR*), type 2 diabetes (*TCF7L2*), higher blood pressure (*GRK4*, *CACNA1D*, *ARMC5*, *SCNN1B*), and dyslipidemia (*PCSK9*, *APOB*, *LDLR*, *CETP*, *LCAT*).⁵¹⁻⁵⁴

On the other hand, non-White people have been experiencing racism in their careers, daily life, and within health care contexts. For example, everyday discrimination and ensuing stress have been associated with higher hypertension risk in Black patients.⁵⁵ Therefore, it is important to distinguish between the genetic differences and social disparities that underlie patients' higher risk of cardiovascular risk factors and disease. The etiology of disparity is critical in determining the mode of treatment; therefore, it is important to distinguish disparities resulting from social disadvantages from those caused by an intrinsic biological cardiovascular variation.^{5,56}

Proposal: Distinct Study Design and Conclusions Drawn Depending on the Etiology of Disparity. Although race-based research can play an important role in understanding the distribution of and risk factors for

cardiovascular disease, genomic analyses can be used in conjunction to provide a more comprehensive understanding, particularly in the context of the increasing diversity of the global population and the rise of mixed-race individuals. Using genomics and the incorporation of precision medicine approaches into study designs in a complementary manner to race-based analyses may have several benefits. These include increased precision and better understanding of cardiovascular disease risk, such as by identifying variations in genes involved in lipid metabolism and blood pressure regulation, or those that may increase the risk of surgical complications.⁵⁷ However, most of the participants in genome-wide association studies have been of European ancestry.⁵⁸ Although the exact percentage is slowly improving, people of European ancestry comprised 86% of genome-wide association studies, but 52.5% of the Canadian population and 16% of the world's population as of 2021.⁵⁹ Concerted efforts must be made to eliminate the persistent bias in genomics sampling resulting from underrepresentation of populations from diverse racial, ethnic, and geographic backgrounds.

Early in the study design stage, researchers need to identify whether they are exploring biological differences that may be present in a subpopulation of a specific race and/or ethnicity vs social differences that are a product of historical racism, because this will determine the research methodology and conclusions drawn from the study findings.^{5,56} When studying associations between patients' race and/or ethnicity and outcomes, objective testing, including genomics and cardiovascular biomechanics that are increasingly studied in aortic surgery, promote personalized decision making. Consequently, these objective assessments will alleviate stereotypes and shortcut decision making that can be made of patients based on their physical features.

PROBLEM 6: INTERSECTIONALITY OF SOCIAL DETERMINANTS OF HEALTH. Often, even when studies define the methods by which participants were racially categorized, additional crucial analyses of related factors from an intersectional lens are missed. Intersectionality, a term coined by the Black feminist scholar Kimberlé Crenshaw,^{7,8} is a theoretical framework originally used to analyze how marginalized individuals are affected by interlacing systems of oppression and power. Social determinants of health, such as race, ethnicity, education, gender, sex, socioeconomic status, and geographic location, impact patients' health and well-being in a manner that is different from a simple additive effect.

However, most cardiac surgical studies do not explore the intersectionality of patient-specific demographic and social factors.⁶⁰ In the meta-analysis by Benedetto and associates¹ exploring racial disparities after CABG, only 7

of 28 studies adjusted for socioeconomic status, despite there being significant differences in median household incomes across the US.⁶¹ Examining the interplay between race, socioeconomic status, and other identities is crucial because this can provide valuable insights and identify potential confounders and effect modifiers. For example, one study reports that life expectancy after acute myocardial infarction is similar for Black and White patients residing in low-socioeconomic status areas but is significantly shorter for Black patients in high- or middle-socioeconomic status areas.⁶² Although there is a strong correlation between race and socioeconomic status, not all individuals of a given race face the same levels of wealth or poverty, health literacy, housing, and privilege or discrimination, and thus, necessitating further analyses of the impact of socioeconomic status.^{63,64}

Further, other interrelated factors, such as distance to tertiary care, hospital quality, hospital size, and insurance patterns, need to be assessed.^{3,64,65} For example, in Canada, accessibility of health services by Indigenous Peoples remains a challenge, because communities may be located in more remote areas or face structural challenges in access to health care services due to the fragmentation of Indigenous health care delivery, a lack of recognition of Indigenous health services and practices, and biases in referral and utilization of care among health care providers.⁶⁶ Additionally, physical accessibility not only encompasses direct proximity to health services but also includes the financial capability to overcome geographic barriers or be able and willing to spend time away from home and/or one's community. Such realizations are important when providing care to patients of a particular racial and/or ethnic group without stereotyping.

Cardiac surgery research can also analyze surgical outcomes through an intersectional lens, further providing insight to possible causes of disparity. For example, hospital quality, as determined by procedure-specific volumes and risk-adjusted morbidity and mortality, has a large influence on racial disparities in outcomes after CABG surgery.³ Black patients, in particular, disproportionately undergo surgery at lower-quality hospitals (ie, those with lower procedure-specific volumes but higher risk-adjusted morbidity and mortality).⁶⁷ This can be attributed to several intersecting factors, including residential racial segregation, unequal referral patterns, and geographic proximity to these hospitals.⁶⁷ Research that captures these intersecting factors could provide a

more nuanced picture and allow for the generation of specific solutions such as more equal referral patterns.

Proposal: Reporting and Analyzing Interrelated Social Determinants of Health. Going from a singular dimension of disparity research, more investigations are needed to study and address intersecting but independent social determinants of health.⁶⁰ Data analyses that report how identifying with a racial and/or ethnic minoritized community compounds with another social disparity (eg, gender, living in rural communities, and low socioeconomic status) to impact access to and outcomes after various surgical procedures will allow for more patient-centered decision making. Practically, this relies on comprehensive data collection for databases and targeted patient recruitment, as described above.

COMMENT

Patients' race and ethnicity have been associated with differential access to, experience of, and outcomes after cardiac surgery. The lack of explicit racial and ethnic categorization and intersectionality considerations in studies ultimately leaves them open to interpretation in clinical settings. As a result, formulating a clear approach that thoughtfully and judiciously considers race and/or ethnicity when treating patients belonging to one or more of these groups can be difficult. This is a fast-growing area of research. Intentional efforts to diversify, elucidate, and report the study population's racial and/or ethnic makeup accurately is the first step to identifying disparities in our field. Moving forward, we call on cardiac surgery researchers and medical journals to be reflective and transparent in the makeup of their study population while working toward promoting diverse and just patient engagement in research. Only when we know which patient populations have poor outcomes preoperatively and postoperatively can we begin to close these gaps and develop more personalized and equitable care for all.

FUNDING SOURCES

Dominique Vervoort is supported by the Canadian Institutes of Health Research (CIHR) Vanier Canada Graduate Scholarship. The other authors have no funding sources to disclose.

DISCLOSURES

Dominique Vervoort, Bobby Yanagawa, and Stephen E. Fremes are on *The Annals of Thoracic Surgery* Editorial Board. The other authors have no conflicts of interest to disclose.

REFERENCES

1. Benedetto U, Kamel MK, Khan FM, et al. Are racial differences in hospital mortality after coronary artery bypass graft surgery real? A risk-adjusted meta-analysis. *J Thorac Cardiovasc Surg.* 2019;157:2216-2225.e4. <https://doi.org/10.1016/J.JTCVS.2018.12.002>
2. Kullo IJ, Bailey KR, Kardia SLR, Mosley TH, Boerwinkle E, Turner ST. Ethnic differences in peripheral arterial disease in the NHLBI Genetic Epidemiology Network of Arteriopathy (GENOA) study. *Vasc Med.* 2003;8:237-242. <https://doi.org/10.1191/1358863X03VM5110A>
3. Rangrass G, Ghaferi AA, Dimick JB. Explaining racial disparities in outcomes after cardiac surgery: the role of hospital quality. *JAMA Surg.* 2014;149:223-227. <https://doi.org/10.1001/JAMASURG.2013.4041>
4. Preventza O, Critsinelis A, Simpson K, et al. Sex, racial, and ethnic disparities in U.S. cardiovascular trials in more than 230,000 patients. *Ann Thorac Surg.* 2021;112:726-735. <https://doi.org/10.1016/J.ATHORACSUR.2020.08.075>
5. Kaufman JS, Dolman L, Rushani D, Cooper RS. The contribution of genomic research to explaining racial disparities in cardiovascular disease: a systematic review. *Am J Epidemiol.* 2015;181:464-472. <https://doi.org/10.1093/AJE/KWU319>
6. American Psychological Association. APA Style: Racial and ethnic identity. Accessed November 9, 2022. <https://apastyle.apa.org/style-grammar-guidelines/bias-free-language/racial-ethnic-minorities>
7. Crenshaw K. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory, and Antiracist Politics. In: Jaggar AM. *Living With Contradictions: Controversies in Feminist Social Ethics.* Routledge; 1989:39-52. <https://doi.org/10.4324/9780429499142-5>
8. Tripp A. Abandoning inauthentic intersectionality. *Appl Psycholinguist.* 2023;44:514-533. <https://doi.org/10.1017/S0142716423000139>
9. Cancelli G, Audisio K, Perezgrovas-Olaria R, et al. Representation of racial minorities in cardiac surgery randomized clinical trials. *J Card Surg.* 2022;37:1311-1316. <https://doi.org/10.1111/JCOCS.16371>
10. U.S. Census Bureau. QuickFacts: United States. Accessed December 18, 2022. <https://www.census.gov/quickfacts/fact/table/US/PST045221>
11. Hwang TJ, Brawley OW. New federal incentives for diversity in clinical trials. *N Engl J Med.* 2022;387:1347-1349. <https://doi.org/10.1056/nejmp2209043>
12. Clark LT, Watkins L, Piña IL, et al. Increasing diversity in clinical trials: overcoming critical barriers. *Curr Probl Cardiol.* 2019;44:148-172. <https://doi.org/10.1016/J.CPCARDIOL.2018.11.002>
13. Kraft SA, Cho MK, Gillespie K, et al. Beyond consent: building trusting relationships with diverse populations in precision medicine research. *Am J Bioeth.* 2018;18:3-20. <https://doi.org/10.1080/15265161.2018.1431322>
14. Sierra-Mercado D, Lázaro-Muñoz G. Enhance diversity among researchers to promote participant trust in precision medicine research. *Am J Bioeth.* 2018;18:44-46. <https://doi.org/10.1080/15265161.2018.1431323>
15. Hill AJ, Jones DB, Woodworth L. Physician-patient race-match reduces patient mortality. *J Health Econ.* 2023;92:102821. <https://doi.org/10.1016/j.jhealeco.2023.102821>
16. Greenwood BN, Hardeman RR, Huang L, Sojourner A. Physician-patient racial concordance and disparities in birthing mortality for newborns. *Proc Natl Acad Sci U S A.* 2020;117:21194-21200. <https://doi.org/10.1073/pnas.1913405117>
17. Popper-Giveon A. Preferring patient-physician concordance: the ambiguity of implicit ethnic bias. *Ethn Health.* 2021;26:1065-1081. <https://doi.org/10.1080/13557858.2019.1620180>
18. LaVeist TA, Nuru-Jeter A, Jones KE. The association of doctor-patient race concordance with health services utilization. *J Public Health Policy.* 2003;24:312-323. <https://doi.org/10.2307/3343378>
19. Takeshita J, Wang S, Loren AW, et al. Association of racial/ethnic and gender concordance between patients and physicians with patient experience ratings. *JAMA Netw Open.* 2020;3:e2024583. <https://doi.org/10.1001/jamanetworkopen.2020.24583>
20. The Society of Thoracic Surgeons. Looking to the Future Scholarship Program. Accessed January 31, 2024. <https://www.sts.org/looking-future-scholarship-program>
21. The American Association for Thoracic Surgery. AATS and AATS Foundation Scholarship Programs. Accessed September 21, 2023. <https://www.aats.org/foundation/all>
22. Sadler GR, Lee HC, Lim RSH, Fullerton J. Recruitment of hard-to-reach population subgroups via adaptations of the snowball sampling strategy. *Nurs Health Sci.* 2010;12:369-374. <https://doi.org/10.1111/J.1442-2018.2010.00541.X>
23. Canadian Institutes of Health Research (CIHR). Canada's research funding agencies raise the bar for a more diverse and inclusive research community. Accessed December 11, 2022. <https://cihr-irsc.gc.ca/e/51566.html>
24. National Institutes of Health. NIH Extramural Nexus. What Are the Requirements for Reporting on Human Study Participant Age, Sex/Gender, and Race/Ethnicity? April 19, 2021. Accessed December 18, 2022. <https://nexus.od.nih.gov/all/2021/04/29/what-are-the-requirements-for-reporting-on-human-study-participant-age-sex-gender-and-race-ethnicity/>
25. Canadian Institutes of Health Research. Welcome to the Canadian Institutes of Health Research (CIHR). Accessed December 11, 2022. <https://cihr-irsc.gc.ca/e/193.html>
26. Canadian Institutes of Health Research. CIHR Anti-Racism External Advisory Committee. April 21, 2022. Accessed December 18, 2022. <https://cihr-irsc.gc.ca/e/52558.html>
27. Flanagan A, Frey T, Christiansen SL. Updated guidance on the reporting of race and ethnicity in medical and science journals. *JAMA.* 2021;326:621-627. <https://doi.org/10.1001/JAMA.2021.13304>
28. AMA Manual of Style Committee. *AMA Manual of Style: A Guide for Authors and Editors.* 11th ed. Oxford University Press; 2020. <https://doi.org/10.1093/JAMA/9780190246556.001.0001>
29. Nuriddin A, Mooney G, White AIR. Reckoning with histories of medical racism and violence in the USA. *Lancet.* 2020;396:949-951. [https://doi.org/10.1016/S0140-6736\(20\)32032-8](https://doi.org/10.1016/S0140-6736(20)32032-8)
30. Tsai JW, Cerdeña JP, Goedel WC, et al. Evaluating the impact and rationale of race-specific estimations of kidney function: estimations from U. S. NHANES, 2015-2018. *eClinicalMedicine.* 2021;42:101197. <https://doi.org/10.1016/J.ECLINM.2021.101197>
31. Flanagan A, Frey T, Christiansen SL, Bauchner H. The reporting of race and ethnicity in medical and science journals: comments invited. *JAMA.* 2021;325:1049-1052. <https://doi.org/10.1001/JAMA.2021.2104>
32. Bird M, Ouellette C, Whitmore C, et al. Preparing for patient partnership: a scoping review of patient partner engagement and evaluation in research. *Health Expect.* 2020;23:523-539. <https://doi.org/10.1111/HEX.13040>
33. Forsythe LP, Carman KL, Szydłowski V, et al. Patient engagement in research: early findings from the Patient-Centered Outcomes Research Institute. *Health Aff (Millwood).* 2019;38:359-367. <https://doi.org/10.1377/HLTHAFF.2018.05067>
34. Bridges D. 'Nothing About Us Without Us': The Ethics of Outsider Research. In: *Philosophy in Educational Research: Epistemology, Ethics, Politics and Quality.* Springer; 2017:341-361. https://doi.org/10.1007/978-3-319-49212-4_20
35. Concannon TW, Fuster M, Saunders T, et al. A systematic review of stakeholder engagement in comparative effectiveness and patient-centered outcomes research. *J Gen Intern Med.* 2014;29:1692-1701. <https://doi.org/10.1007/S11606-014-2878-X>
36. Hernandez-Morgan M, Stypula C, Fischer M, Grogan T, Neelankavil J. Impact of the Affordable Care Act on disparities in access to and outcomes after coronary artery bypass grafting. *J Racial Ethn Health Disparities.* 2023;10:2783-2791. <https://doi.org/10.1007/S40615-022-01455-8>

37. O'Shaughnessy S, Tangel V, Dzotsi S, Jiang S, White R, Hoyler M. Non-White race/ethnicity and female sex are associated with increased allogeneic red blood cell transfusion in cardiac surgery patients: 2007-2018. *J Cardiothorac Vasc Anesth*. 2022;36:1908-1918. <https://doi.org/10.1053/J.VJCA.2021.11.021>
38. Sutton TS, McKay RG, Mather J, et al. Enhanced Recovery After Surgery is associated with improved outcomes and reduced racial and ethnic disparities after isolated coronary artery bypass surgery: a retrospective analysis with propensity-score matching. *J Cardiothorac Vasc Anesth*. 2022;36:2418-2431. <https://doi.org/10.1053/J.VJCA.2022.02.027>
39. Tertulien T, Roberts MB, Eaton CB, et al. Association between race/ethnicity and income on the likelihood of coronary revascularization among postmenopausal women with acute myocardial infarction: Women's Health Initiative study. *Am Heart J*. 2022;246:82-92. <https://doi.org/10.1016/J.AHJ.2021.12.013>
40. Lin SS, Kelsey JL. Use of race and ethnicity in epidemiologic research: concepts, methodological issues, and suggestions for research. *Epidemiol Rev*. 2000;22:187-202. <https://doi.org/10.1093/OXFORDJOURNALS.EPIREV.A018032>
41. Bokor-Billmann T, Langan EA, Billmann F. The reporting of race and/or ethnicity in the medical literature: a retrospective bibliometric analysis confirmed room for improvement. *J Clin Epidemiol*. 2020;119:1-6. <https://doi.org/10.1016/J.JCLINEPI.2019.11.005>
42. International Committee of Medical Journal Editors (ICMJE). Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. Published May 2022. Accessed June 7, 2022. <https://www.icmje.org/icmje-recommendations.pdf>
43. Little W, McGivern R. *Introduction to Sociology—1st Canadian Edition*. <https://opentextbc.ca/introductiontosociology>. BC Campus; published online November 6, 2014.
44. Rumsfeld JS, Plomondon ME, Peterson ED, et al. The impact of ethnicity on outcomes following coronary artery bypass graft surgery in the Veterans Health Administration. *J Am Coll Cardiol*. 2002;40:1786-1793. [https://doi.org/10.1016/S0735-1097\(02\)02485-3](https://doi.org/10.1016/S0735-1097(02)02485-3)
45. Enumah ZO, Canner JK, Alejo D, et al. Persistent racial and sex disparities in outcomes after coronary artery bypass surgery. *Ann Surg*. 2020;272:660-667. <https://doi.org/10.1097/sla.0000000000004335>
46. Goodney PP, Brooke BS, Wallaert J, et al. Thoracic endovascular aneurysm repair, race, and volume in thoracic aneurysm repair. *J Vasc Surg*. 2013;57:56-63.e1. <https://doi.org/10.1016/J.JVS.2012.07.036>
47. Yin K, AlHajri N, Rizwan M, Locham S, Dakour-Aridi H, Malas MB. Black patients have a higher burden of comorbidities but a lower risk of 30-day and 1-year mortality after thoracic endovascular aortic repair. *J Vasc Surg*. 2021;73:2071-2080.e2. <https://doi.org/10.1016/J.JVS.2020.10.087>
48. Butler-Sweet C. "Race isn't what defines me": exploring identity choices in transracial, biracial, and monoracial families. *Soc Identities*. 2011;17:747-769. <https://doi.org/10.1080/13504630.2011.606672>
49. Aronson J, Burgess D, Phelan SM, Juarez L. Unhealthy interactions: the role of stereotype threat in health disparities. *Am J Public Health*. 2013;103:50-56. <https://doi.org/10.2105/AJPH.2012.300828>
50. Gomez SL, Kelsey JL, Glaser SL, Lee MM, Sidney S. Inconsistencies between self-reported ethnicity and ethnicity recorded in a health maintenance organization. *Ann Epidemiol*. 2005;15:71-79. <https://doi.org/10.1016/J.ANNEPIDEM.2004.03.002>
51. Parcha V, Malla G, Ivin MR, et al. Association of transthyretin Va1122Ile variant with incident heart failure among Black individuals. *JAMA*. 2022;327:1368-1378. <https://doi.org/10.1001/JAMA.2022.2896>
52. Zilbermint M, Hannah-Shmouni F, Stratakis CA. Genetics of hypertension in African Americans and others of African descent. *Int J Mol Sci*. 2019;20:1081. <https://doi.org/10.3390/IJMS20051081>
53. Arnett DK, Meyers KJ, Devereux RB, et al. Genetic variation in NCAM1 contributes to left ventricular wall thickness in hypertensive families. *Circ Res*. 2011;108:279-283. <https://doi.org/10.1161/CIRCRESAHA.110.239210>
54. Lettre G, Palmer CD, Young T, et al. Genome-wide association study of coronary heart disease and its risk factors in 8,090 African Americans: The NHLBI CARE Project. *PLoS Genet*. 2011;7:e1001300. <https://doi.org/10.1371/JOURNAL.PGEN.1001300>
55. Forde AT, Sims M, Muntner P, et al. Discrimination and hypertension risk among African Americans in the Jackson Heart Study. *Hypertension*. 2020;76:715-723. <https://doi.org/10.1161/HYPERTENSIONAHA.119.14492>
56. Williams DR, Leavell J. The social context of cardiovascular disease: challenges and opportunities for the Jackson Heart Study. *Ethn Dis*. 2012;22(suppl 1):S1-S21.
57. Stüber F, Hoelt A. The influence of genomics on outcome after cardiovascular surgery. *Curr Opin Anaesthesiol*. 2002;15:3-8. <https://doi.org/10.1097/00001503-200202000-00002>
58. Need AC, Goldstein DB. Next generation disparities in human genomics: concerns and remedies. *Trends Genet*. 2009;25:489-494. <https://doi.org/10.1016/J.TIG.2009.09.012>
59. Fatumo S, Chikowore T, Choudhury A, Ayub M, Martin AR, Kuchenbaecker K. A roadmap to increase diversity in genomic studies. *Nat Med*. 2022;28:243-250. <https://doi.org/10.1038/s41591-021-01672-4>
60. Elfaki LA, Keshishi M, Mbdc B, Nwakoby A, Vervoort D. From singularity to plurality: the case for intersectionality in cardiothoracic surgery research. *JTCVS Open*. 2023;13:52-53. <https://doi.org/10.1016/J.XJON.2022.11.014>
61. An KR, Tam DY, Fremes SE. Commentary: the association of race with coronary artery bypass grafting mortality: a complex issue. *J Thorac Cardiovasc Surg*. 2019;157:2226-2227. <https://doi.org/10.1016/J.JTCVS.2018.12.066>
62. Buchholz EM, Ma S, Normand SLT, Krumholz HM. Race, socioeconomic status, and life expectancy after acute myocardial infarction. *Circulation*. 2015;132:1338-1346. <https://doi.org/10.1161/CIRCULATIONAHA.115.017009>
63. Kressin NR, Clark JA, Whittle J, et al. Racial differences in health-related beliefs, attitudes, and experiences of VA cardiac patients: scale development and application. *Med Care*. 2002;40(suppl):I-72-I-85. <https://doi.org/10.1097/00005650-200201001-00009>
64. Baicker K, Chandra A, Skinner J. Geographic variation in health care and the problem of measuring racial disparities. *Perspect Biol Med*. 2005;48:42-S53. <https://doi.org/10.1353/PBM.2005.0020>
65. Robitaille C, Dai S, Waters C, et al. Diagnosed hypertension in Canada: incidence, prevalence and associated mortality. *CMAJ*. 2012;184:E49-E56. <https://doi.org/10.1503/cmaj.101863>
66. Vervoort D, Kimmaliardjuk DM, Ross HJ, Fremes SE, Ouzounian M, Mashford-Pringle A. Access to cardiovascular care for indigenous peoples in Canada: a rapid review. *CJC Open*. 2022;4:782-791. <https://doi.org/10.1016/j.cjc0.2022.05.010>
67. Dimick J, Ruhter J, Sarrazin MV, Birkmeyer JD. Black patients more likely than whites to undergo surgery at low-quality hospitals in segregated regions. *Health Aff (Millwood)*. 2013;32:1046-1053. <https://doi.org/10.1377/hlthaff.2011.1365>