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*Stanford University Medical Center*

# Promoting Equity in Cardiovascular Procedural Care in the VA Healthcare System

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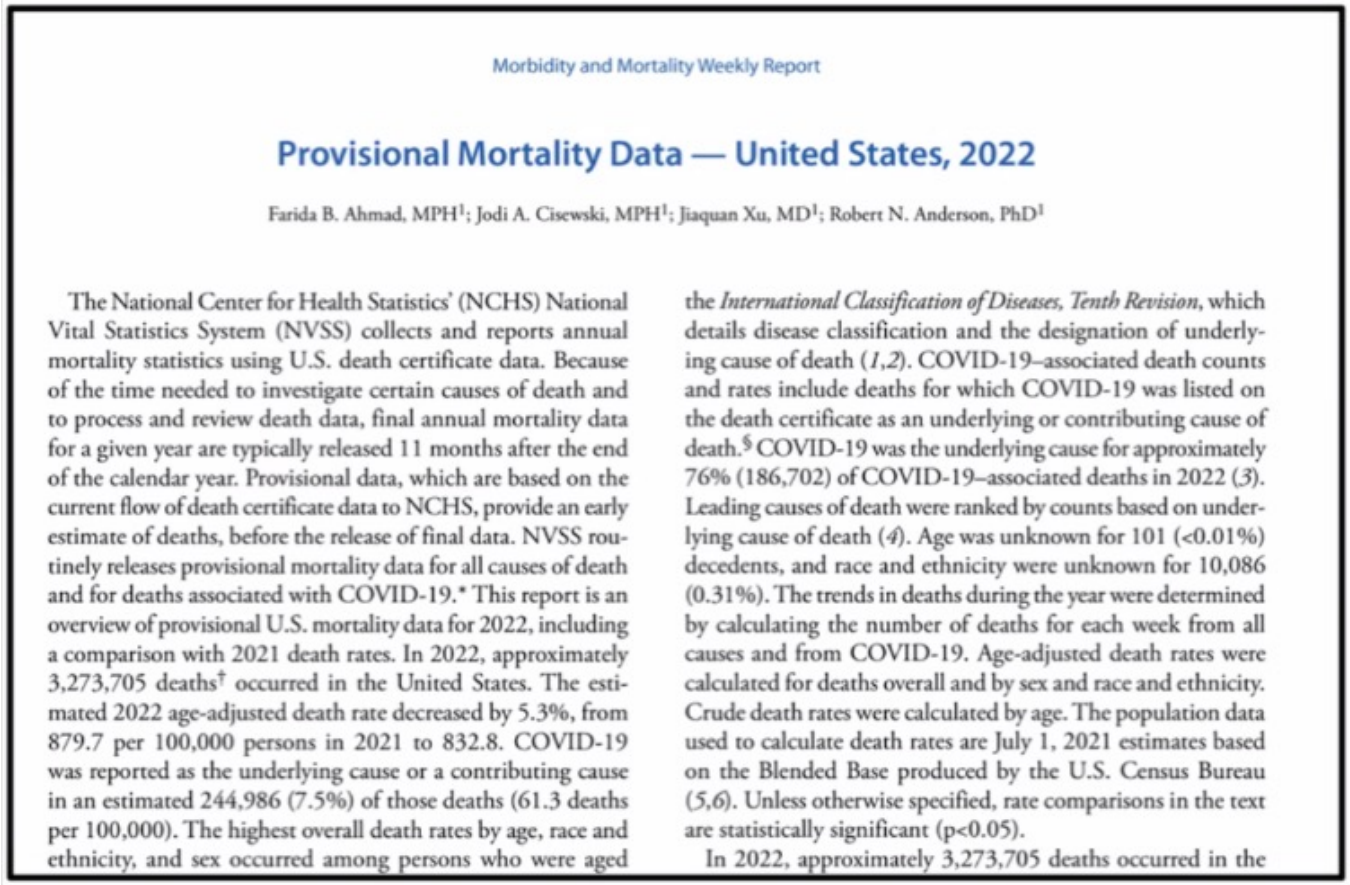
# Outline

- **Changing Landscape of Cardiovascular Disease Burden and Procedural Care**
- COVID-19 Impacts
- Novel Approaches to Promoting Equity
  - Assessing SDoH Needs
  - Scalable Peer Coaching to Support Decision-Making among Diverse Populations
  - Digital Tools for Remote Monitoring

# Heart disease mortality **increased** in 2022.



Morbidity and Mortality Weekly Report

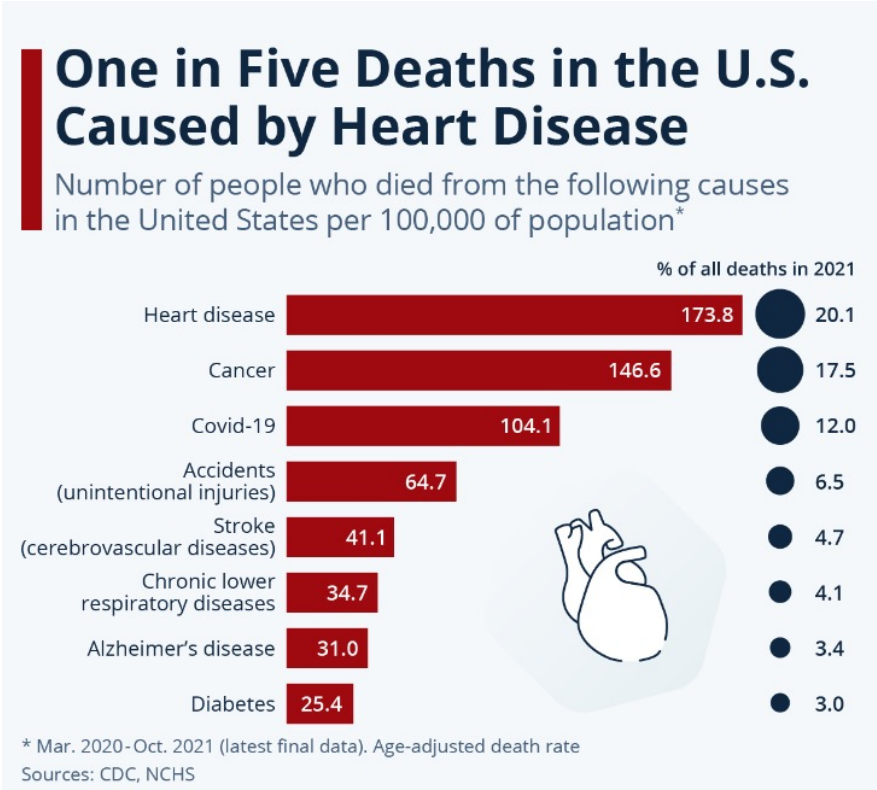
## Provisional Mortality Data — United States, 2022

Farida B. Ahmad, MPH[1]; Jodi A. Cisewski, MPH[1]; Jiaquan Xu, MD[1]; Robert N. Anderson, PhD[1]

The National Center for Health Statistics' (NCHS) National Vital Statistics System (NVSS) collects and reports annual mortality statistics using U.S. death certificate data. Because of the time needed to investigate certain causes of death and to process and review death data, final annual mortality data for a given year are typically released 11 months after the end of the calendar year. Provisional data, which are based on the current flow of death certificate data to NCHS, provide an early estimate of deaths, before the release of final data. NVSS routinely releases provisional mortality data for all causes of death and for deaths associated with COVID-19.* This report is an overview of provisional U.S. mortality data for 2022, including a comparison with 2021 death rates. In 2022, approximately 3,273,705 deaths† occurred in the United States. The estimated 2022 age-adjusted death rate decreased by 5.3%, from 879.7 per 100,000 persons in 2021 to 832.8. COVID-19 was reported as the underlying cause or a contributing cause in an estimated 244,986 (7.5%) of those deaths (61.3 deaths per 100,000). The highest overall death rates by age, race and ethnicity, and sex occurred among persons who were aged

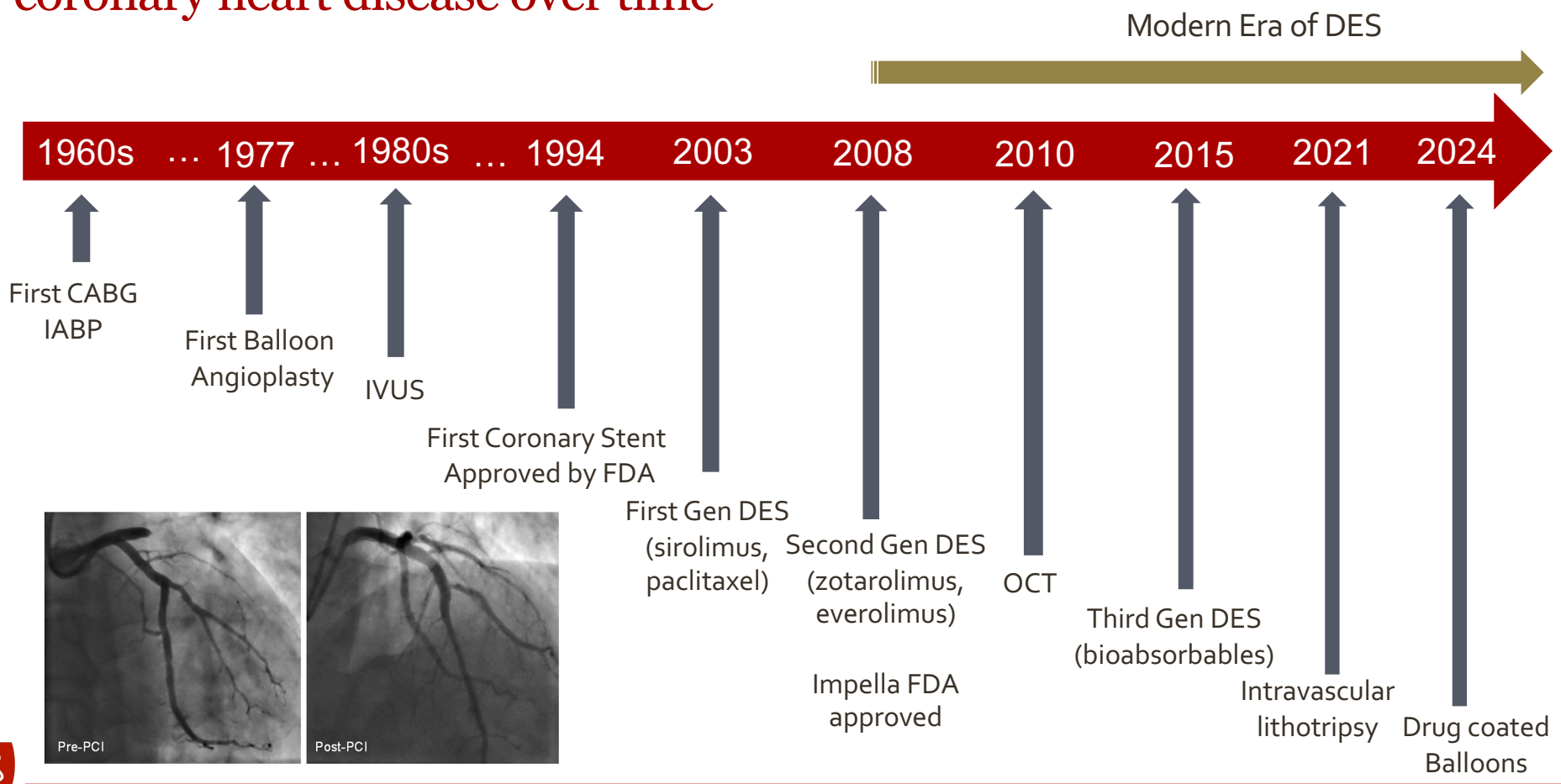
the *International Classification of Diseases, Tenth Revision*, which details disease classification and the designation of underlying cause of death (*1*,*2*). COVID-19–associated death counts and rates include deaths for which COVID-19 was listed on the death certificate as an underlying or contributing cause of death.§ COVID-19 was the underlying cause for approximately 76% (186,702) of COVID-19–associated deaths in 2022 (*3*). Leading causes of death were ranked by counts based on underlying cause of death (*4*). Age was unknown for 101 (<0.01%) decedents, and race and ethnicity were unknown for 10,086 (0.31%). The trends in deaths during the year were determined by calculating the number of deaths for each week from all causes and from COVID-19. Age-adjusted death rates were calculated for deaths overall and by sex and race and ethnicity. Crude death rates were calculated by age. The population data used to calculate death rates are July 1, 2021 estimates based on the Blended Base produced by the U.S. Census Bureau (*5*,*6*). Unless otherwise specified, rate comparisons in the text are statistically significant ($p<0.05$).

In 2022, approximately 3,273,705 deaths occurred in the

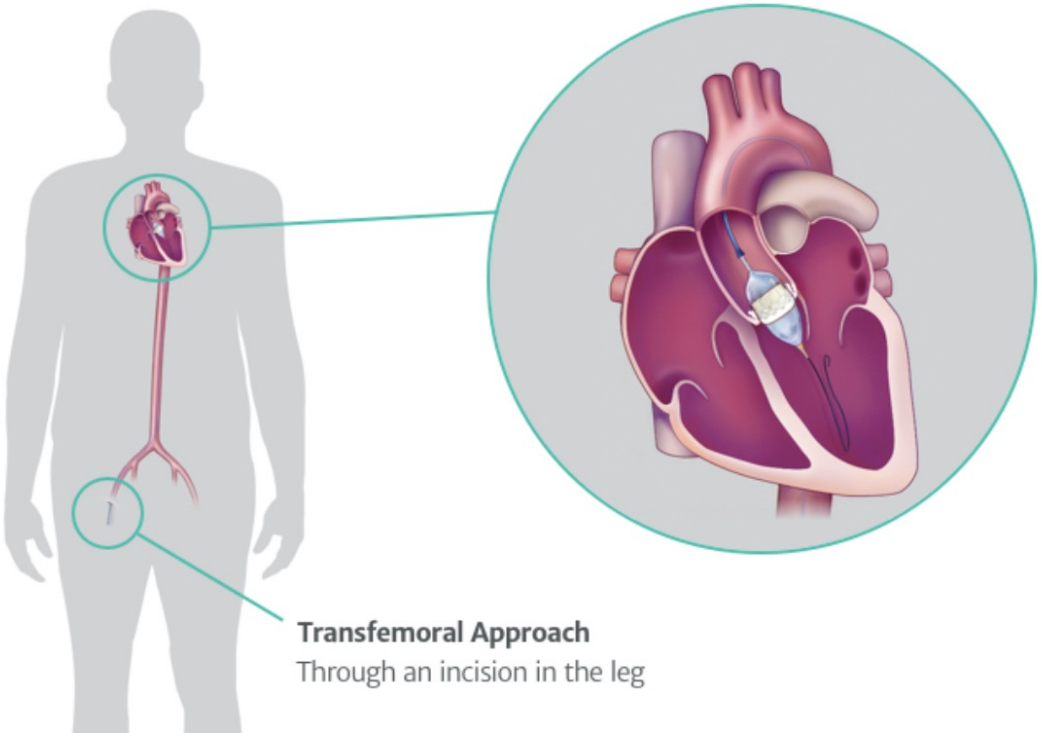


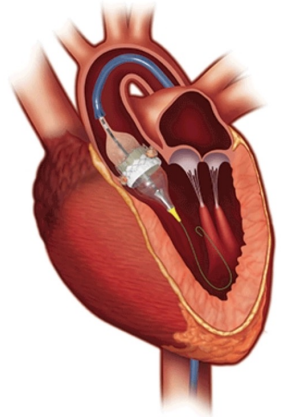

Coronary heart disease is the most common type of heart disease

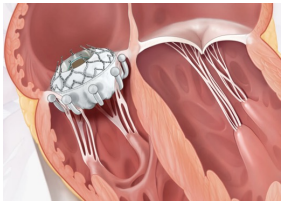
# Innovations in minimally invasive care have transformed treatment options for coronary heart disease over time

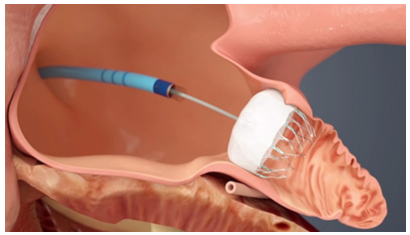


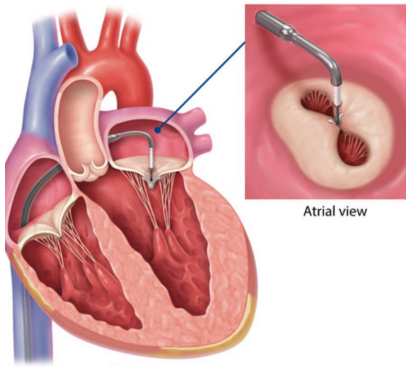
# Structural heart interventions transforming the treatment paradigm

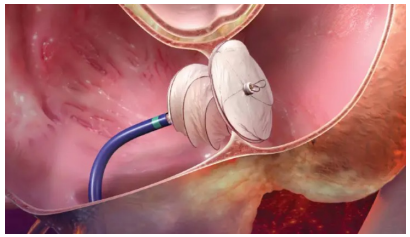


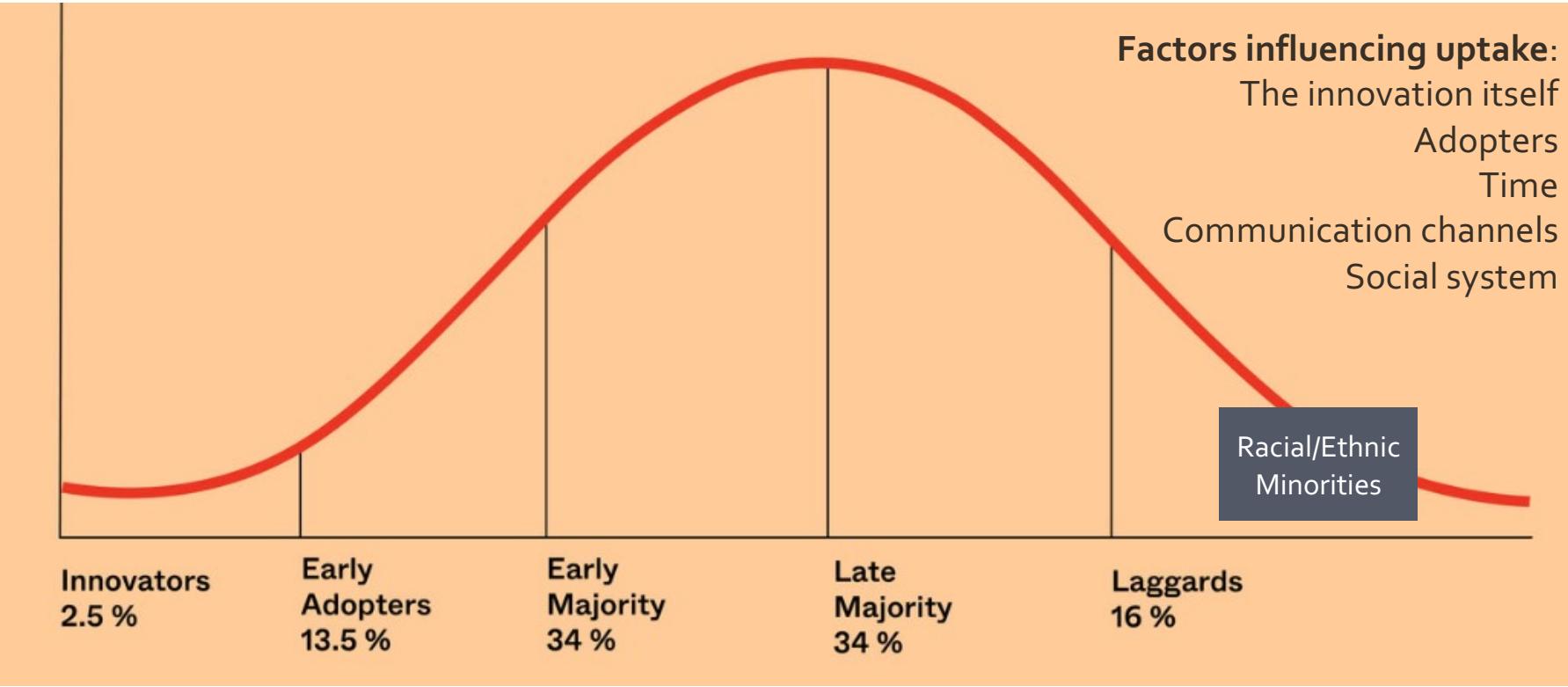






# Diffusion of innovation curve

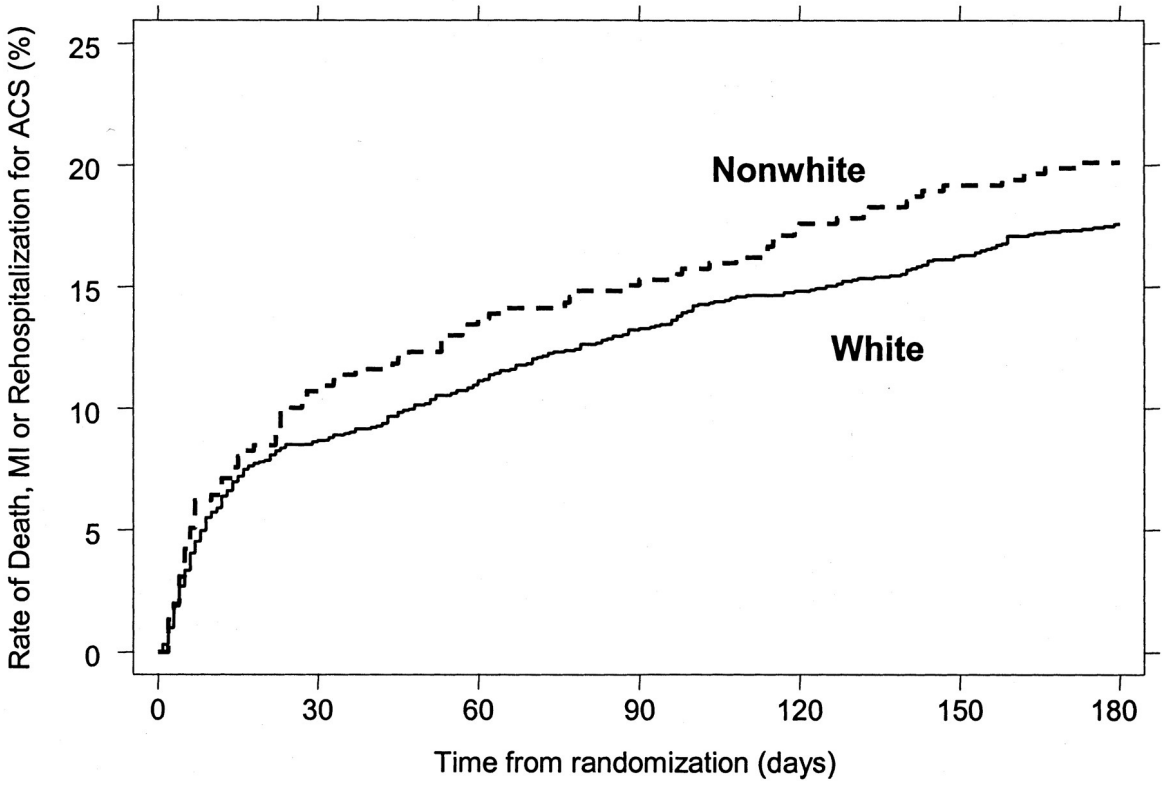





*Everett Rogers, Diffusion of Innovation, 1962*

# TACTICS-TIMI 18:

*Randomized trial of invasive vs. conservative therapy in NSTE ACS*



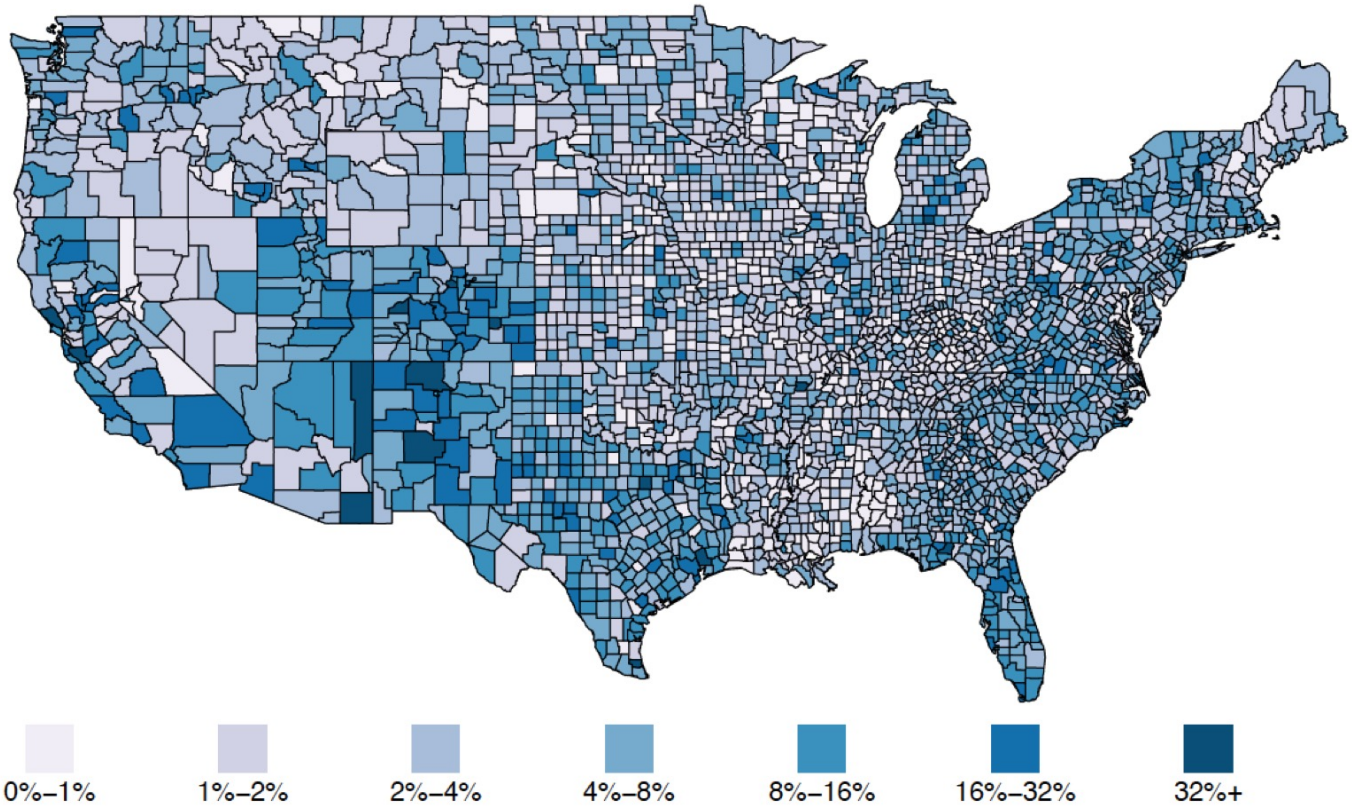

Cumulative incidence of primary end point (death, MI, or rehospitalization)



*Sabatine M et al. Circulation, 2005*

# But our patient population is rapidly changing

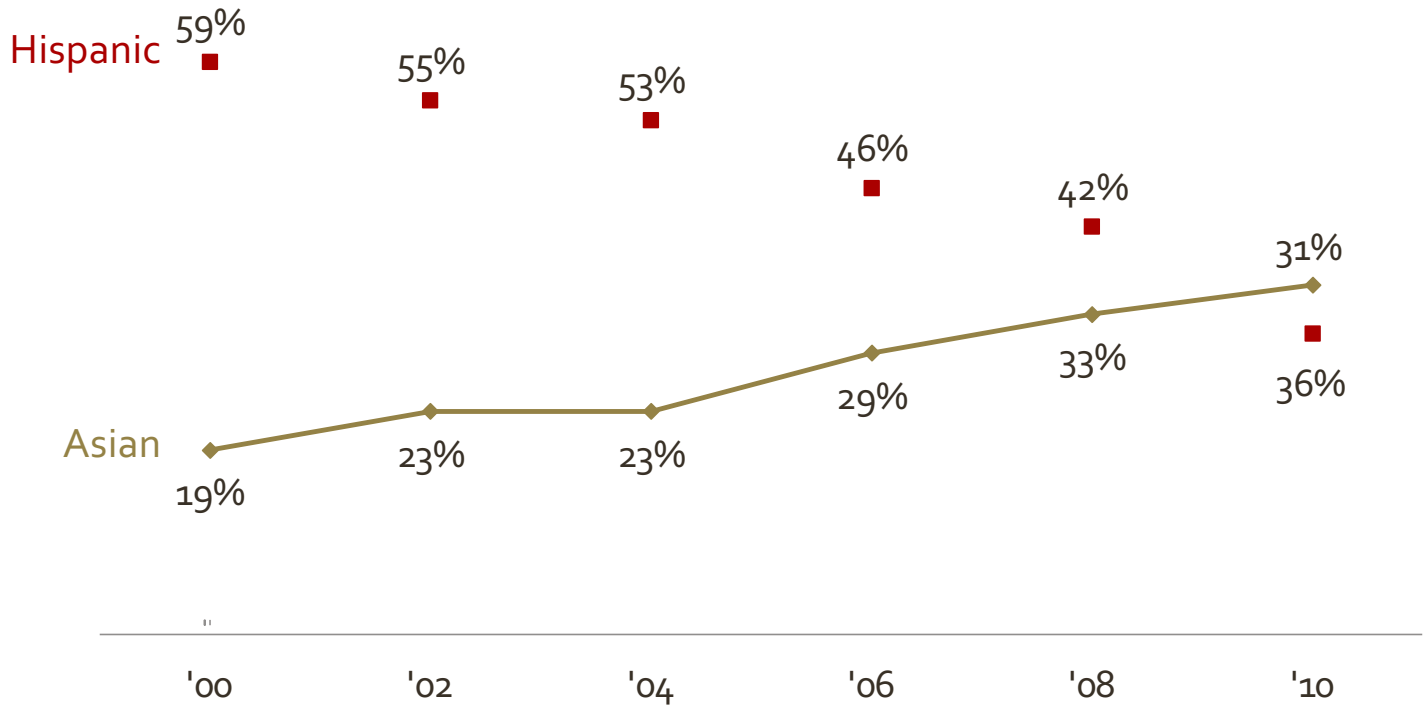
*Percent immigrants by county according to U.S. Census*






*Place of Birth by Nativity and Citizenship Status, 2010-2014 American Community Survey 5-Year*

# Evolving demographics of immigrants in the U.S.





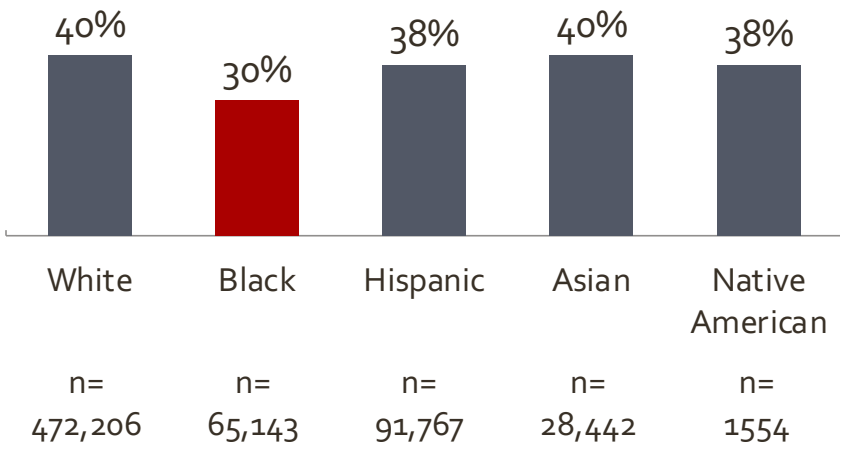

*Pew Research Center Analysis of 2010 American Community Survey*

# Among patients with Acute Coronary Syndrome, Black patients are least likely to receive PCI, and if they do, least likely to receive a DES

## PCI by Race

P<0.0001

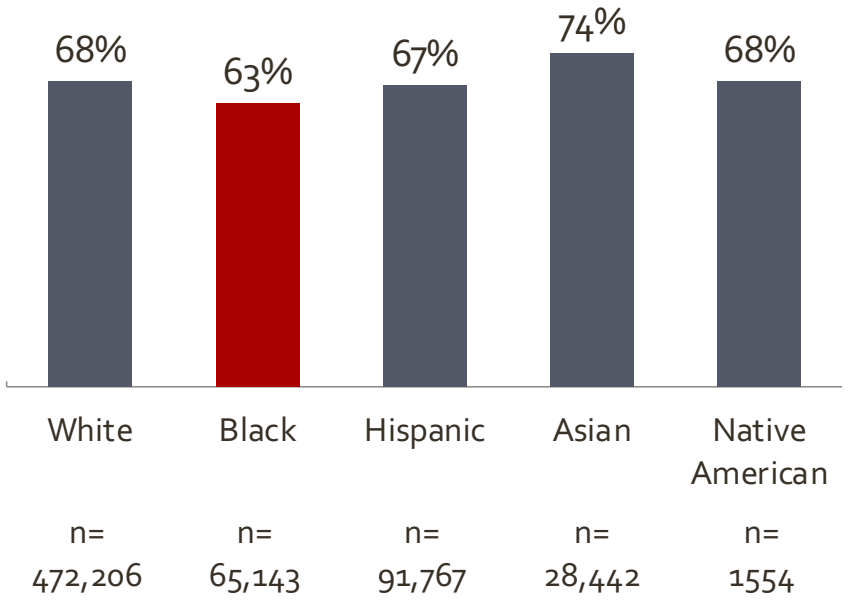
% patients who received any PCI




## DES Use by Race

P<0.0001

% patients who received a DES





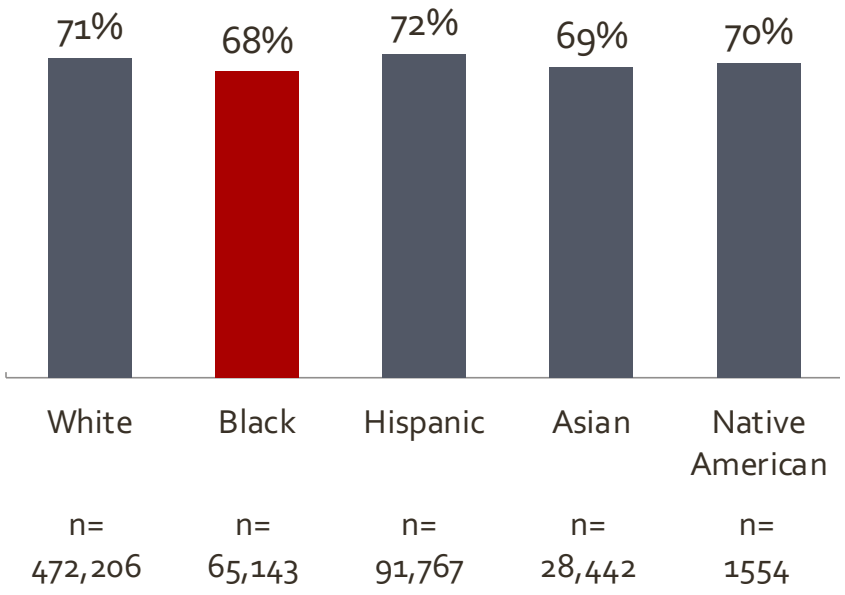

*Yong C et al. AJC 2018.*

# Black patients receive the least timely guideline-indicated care for ACS

P<0.0001

## Angiogram within 24h if STEMI by Race

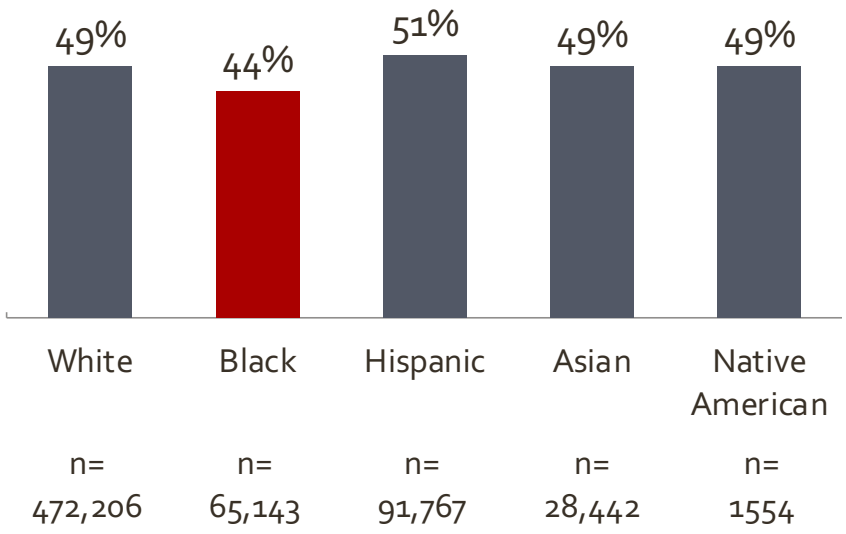
% STEMI patients who receive angiogram within 24 hrs




P<0.0001

## Angiogram within 48h if NSTEMI by Race

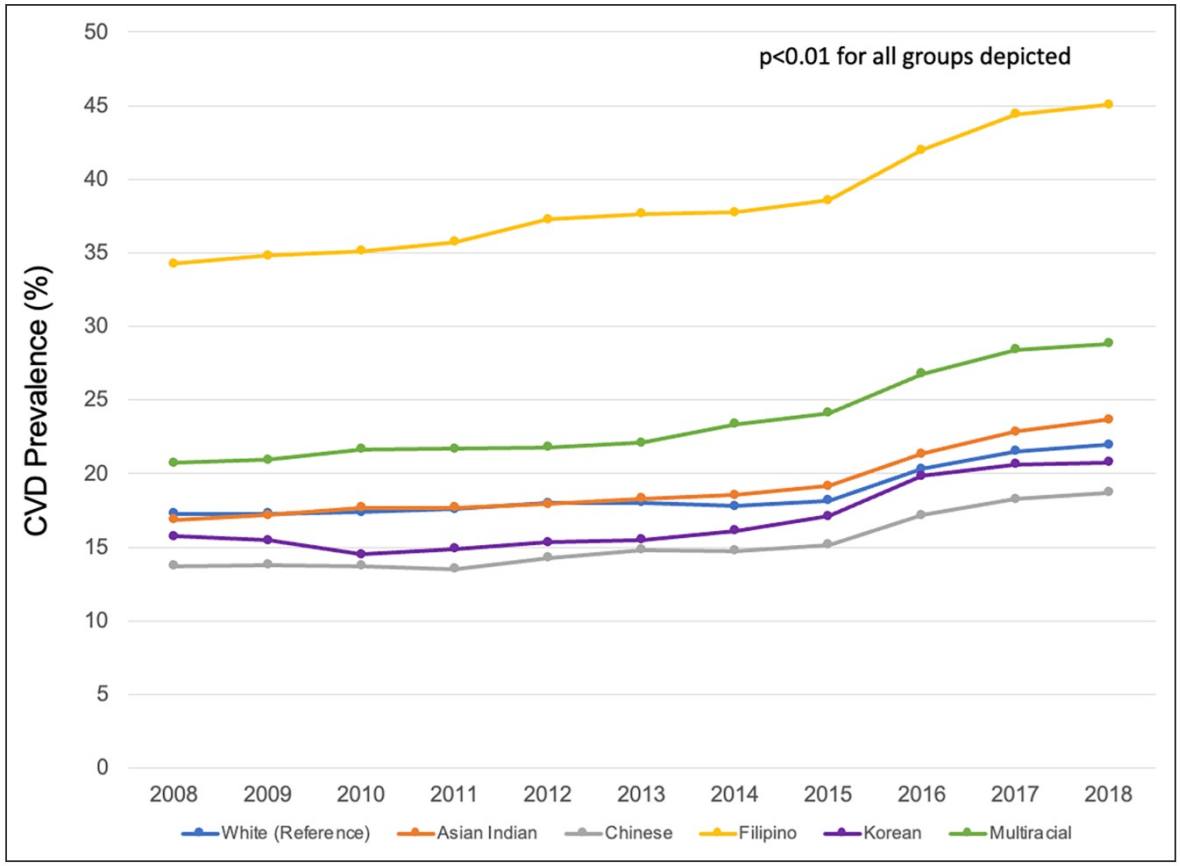
% NSTEMI patients who receive angiogram within 48hrs






*Yong C et al. AJC 2018.*

# Temporal Trends in CVD Prevalence among Asian American Subgroups

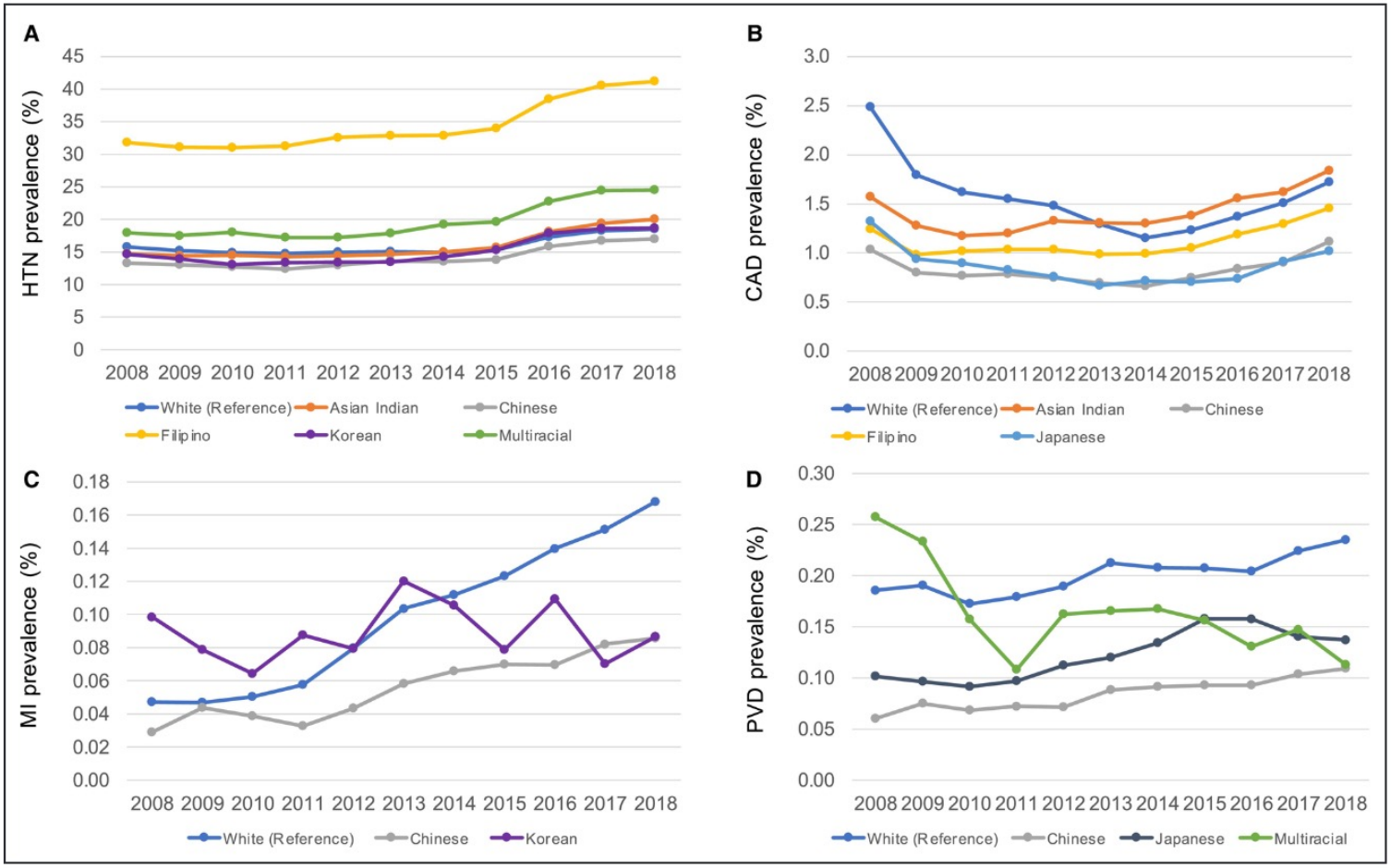



Disaggregation reveals diversity within Asian subgroups



*Nguyen K…Yong C. JAHA. 2024*

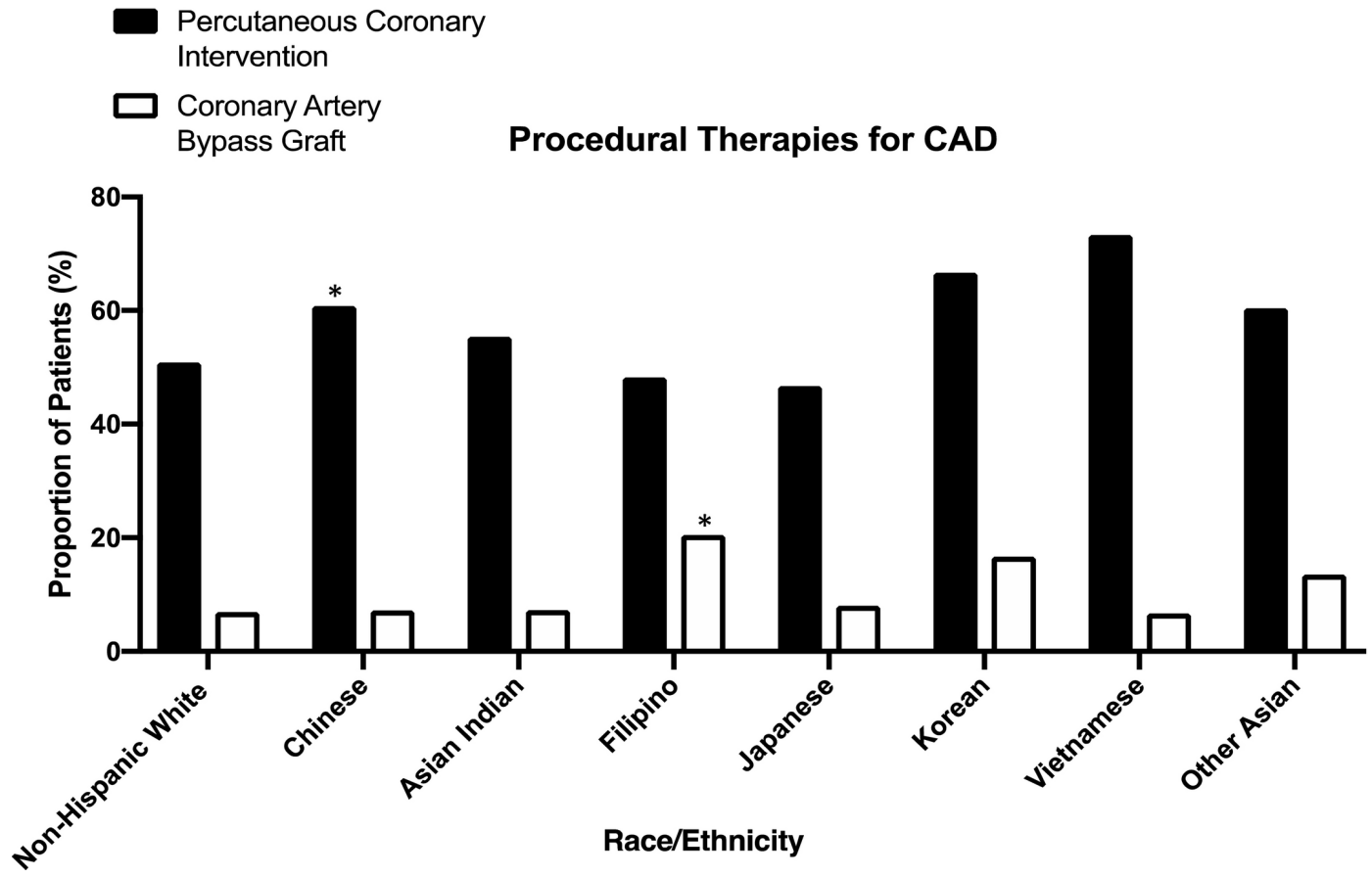
# Temporal Trends in CVD Prevalence among Asian American Subgroups






*Nguyen K...Yong C. JAHA. 2024*

# Heterogeneity of Treatment among Asians with CAD in the US

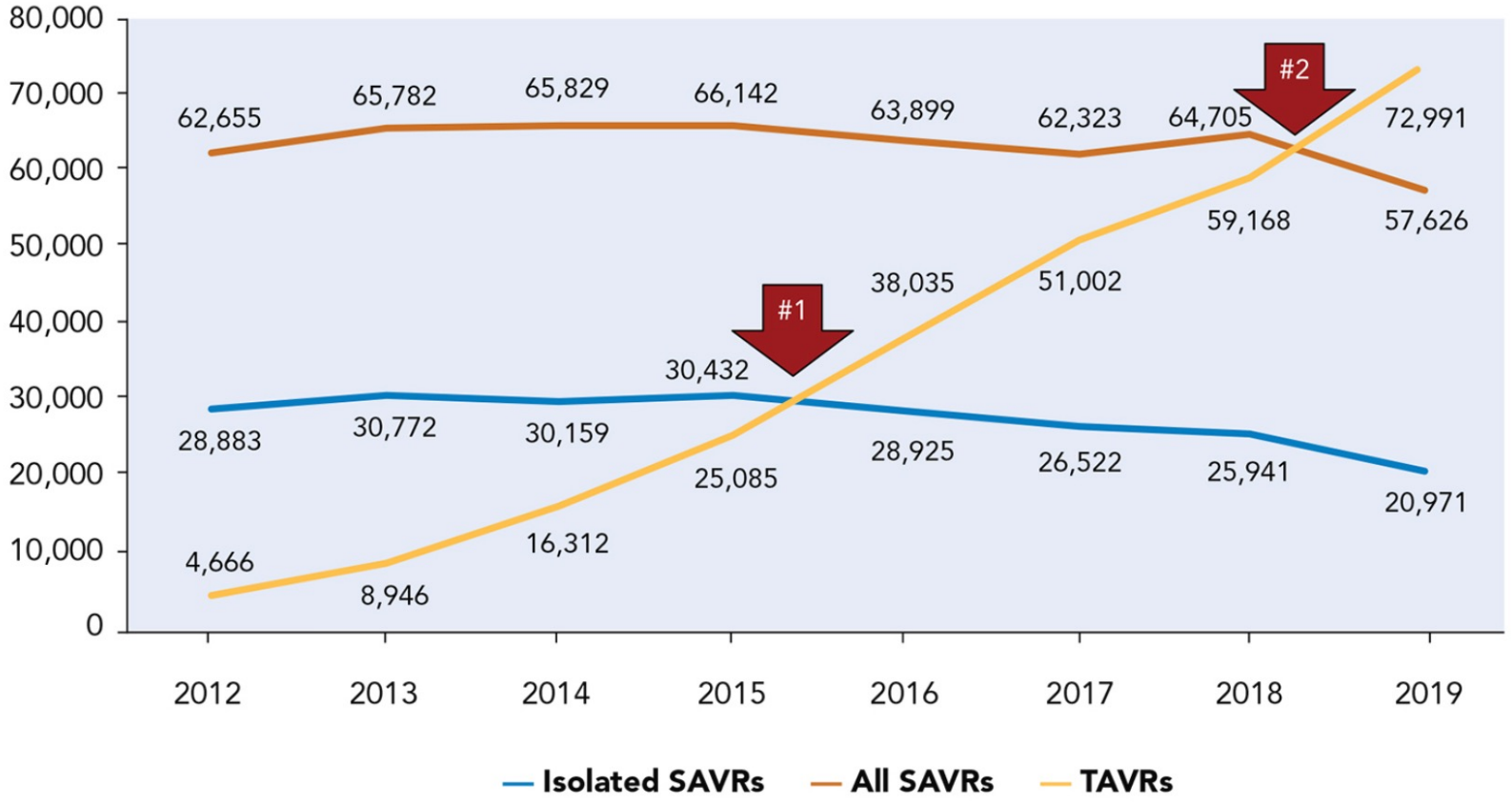





*Manjunath L,….Yong CM. JAHA. 2018*

# Growth of Novel Minimally Invasive Procedures for Structural Heart Disease

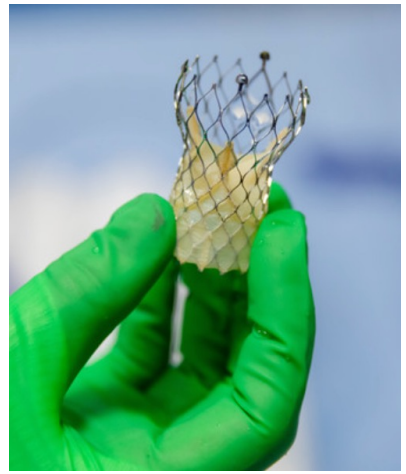
*Rates of TAVR and SAVR from 2012-2019*

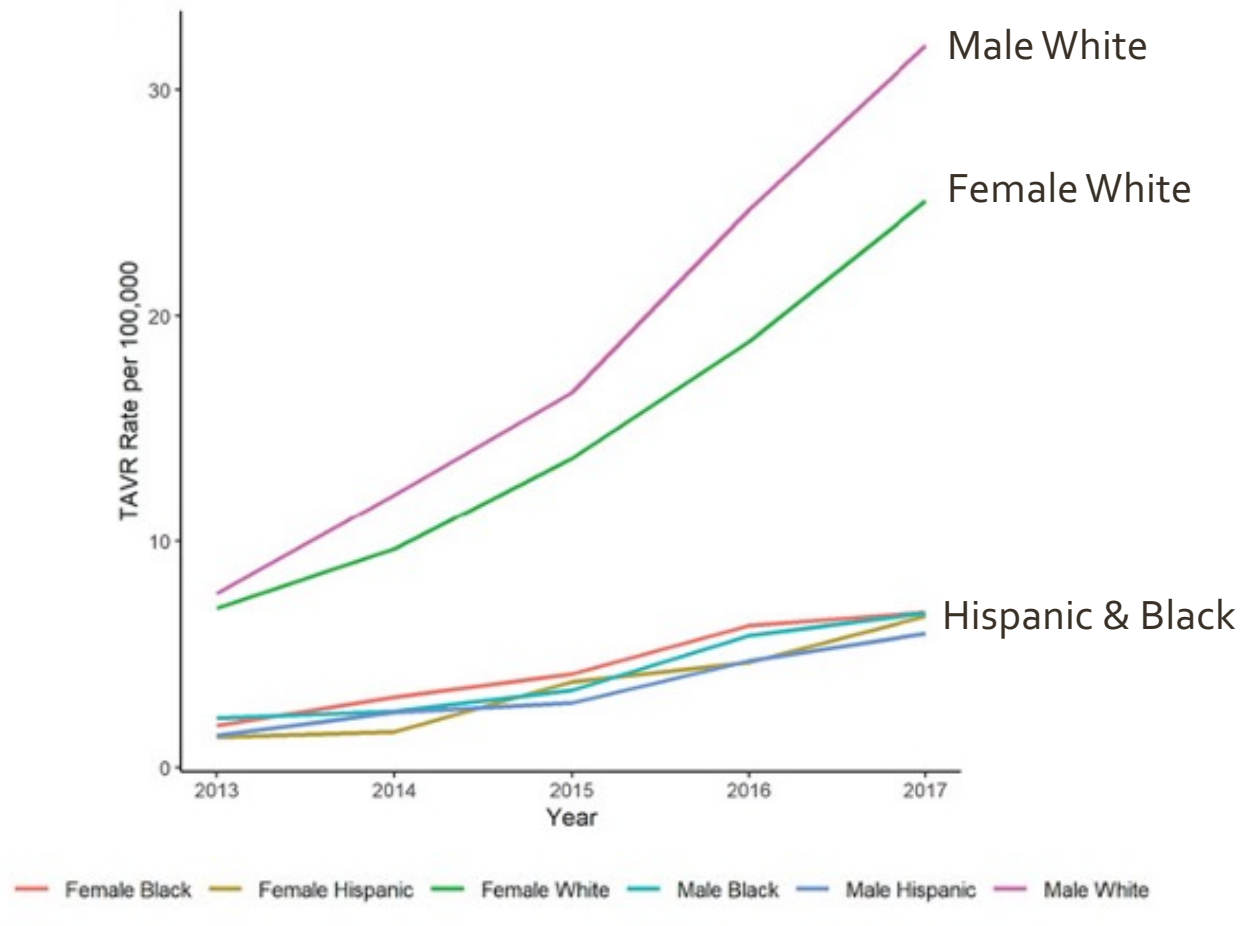





*Mack M, ACC.org, 2021*

# TAVR Differential Uptake by Race, Ethnicity, and Sex

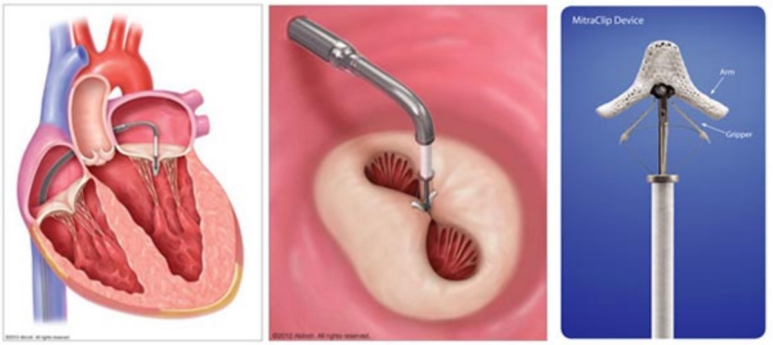


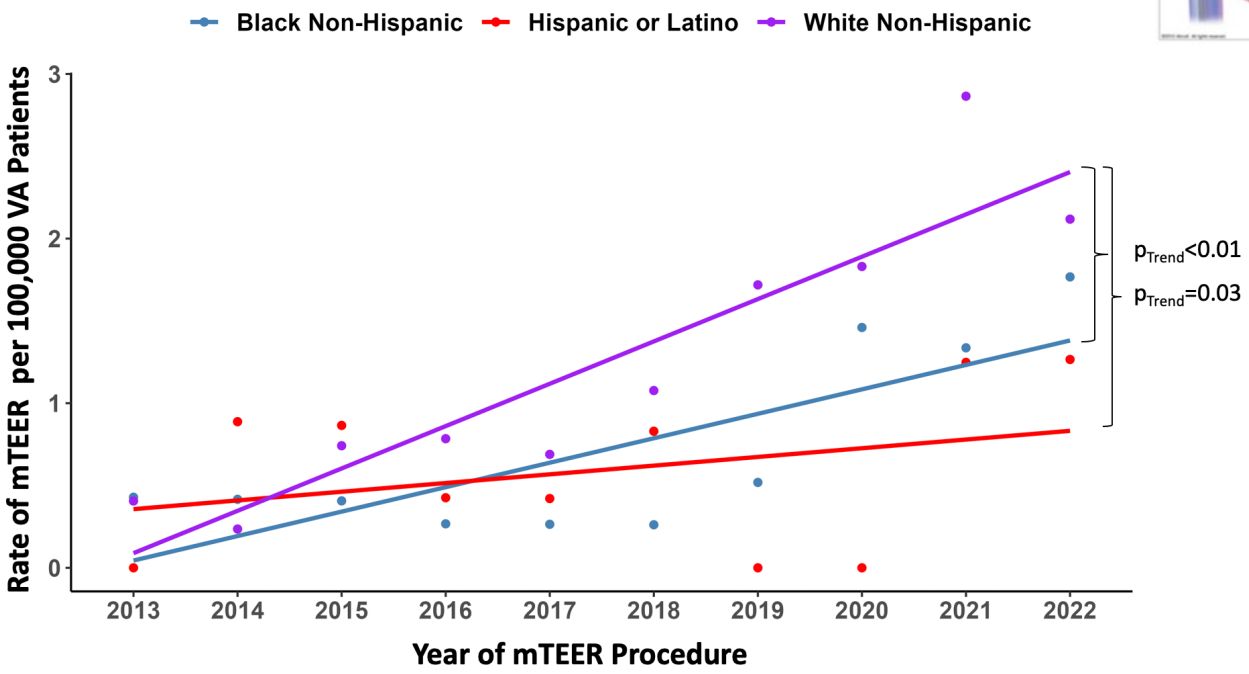





*Yong CM, et al. CCI, 2022*

# Racial and Ethnic Differences in Adoption of Mitral Valve Transcatheter Edge to Edge Repair over a Decade in the VAHCS



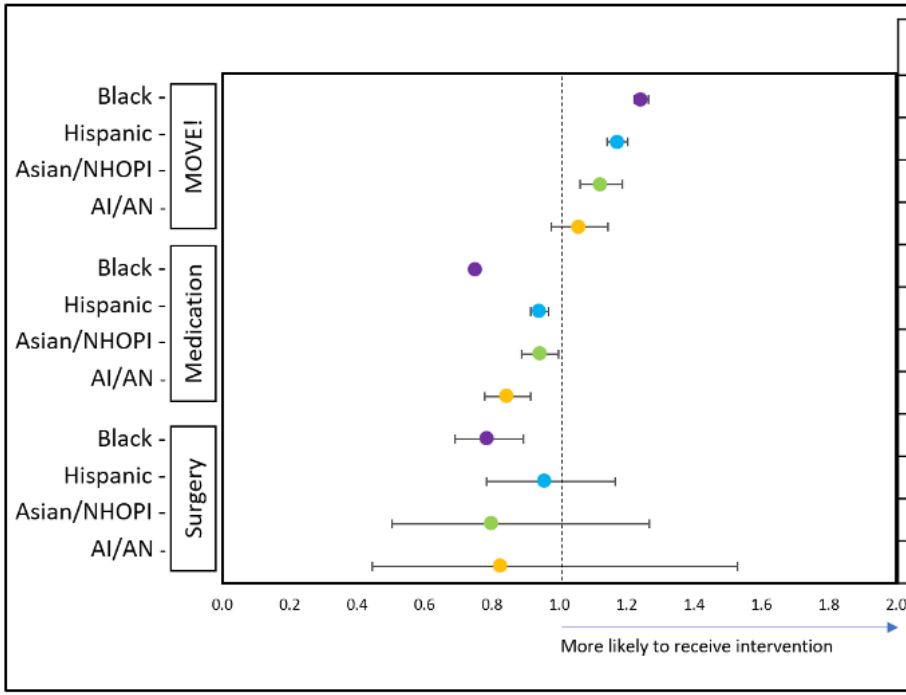






*Pillai B,…Yong CM. AHA 2023.*

# Racial and Ethnic Differences in Obesity Treatment Strategies in the VAHCS

**FIGURE 1: ADJUSTED ODDS RATIO OF RECEIVING OBESITY INTERVENTIONS BY RACE/ ETHNICITY**




| | Odds Ratio | Lower 95% CI | Upper 95% CI | p-value |
|---|---|---|---|---|
| Black - MOVE! | 1.243 | 1.222 | 1.264 | <0.001 |
| Hispanic - MOVE! | 1.172 | 1.141 | 1.204 | <0.001 |
| Asian/NHOPI - MOVE! | 1.123 | 1.063 | 1.187 | <0.001 |
| AI/AN - MOVE! | 1.058 | 0.977 | 1.145 | 0.2967 |
| Black - Medication | 0.75 | 0.737 | 0.764 | <0.001 |
| Hispanic - Medication | 0.941 | 0.914 | 0.968 | <0.001 |
| Asian/NHOPI - Medication | 0.942 | 0.888 | 0.999 | 0.0423 |
| AI/AN - Medication | 0.844 | 0.778 | 0.916 | <0.001 |
| Black - Surgery | 0.786 | 0.691 | 0.893 | <0.001 |
| Hispanic - Surgery | 0.956 | 0.783 | 1.167 | 0.9721 |
| Asian/NHOPI - Surgery | 0.799 | 0.504 | 1.268 | 0.6753 |
| AI/AN - Surgery | 0.826 | 0.446 | 1.528 | 0.9158 |

*Adjusted odds ratio obtained with multivariate logistic regression with adjustments for sociodemographic and clinical factors in comparison to non-Hispanic White Veterans*

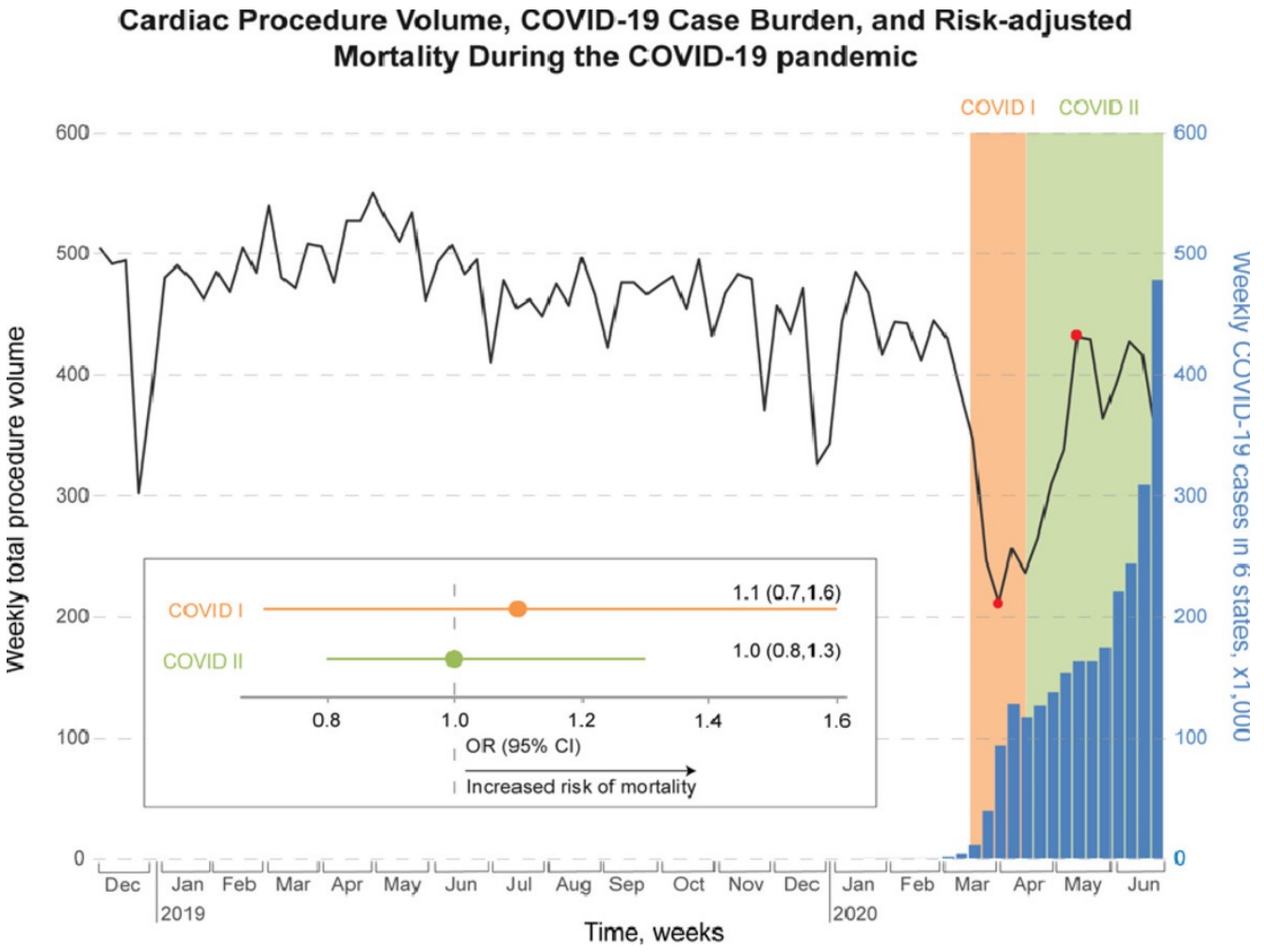


*Tang W, Tisdale R,...Yong CM. ACC.24.*

# Outline

- Changing Landscape of Cardiovascular Disease Burden and Procedural Care
- **COVID-19 Impacts**
- Novel Approaches to Promoting Equity
  - Assessing SDoH Needs
  - Scalable Peer Coaching to Support Decision-Making among Diverse Populations
  - Digital Tools for Remote Monitoring

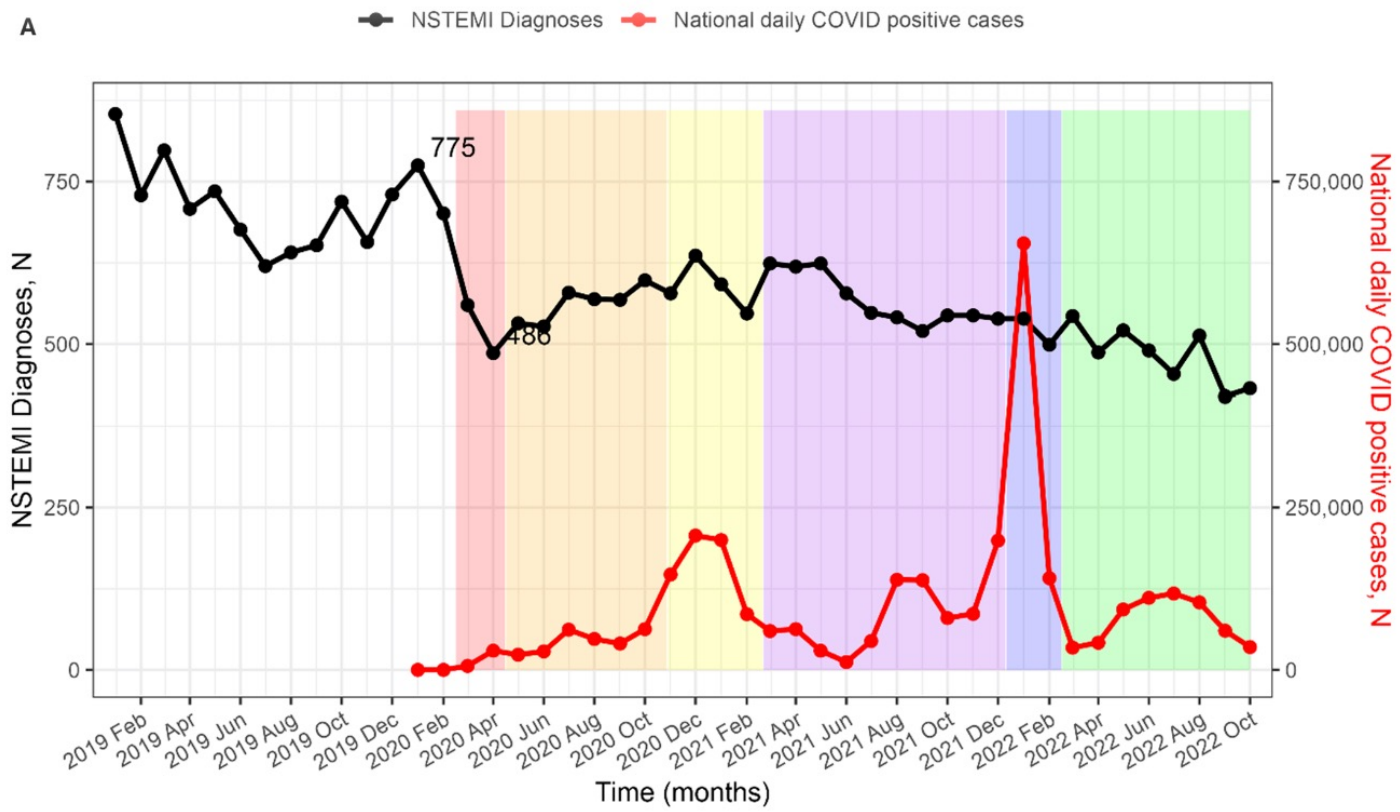
# Cardiovascular procedural deferral and outcomes over COVID-19 pandemic phases: A multi-center study





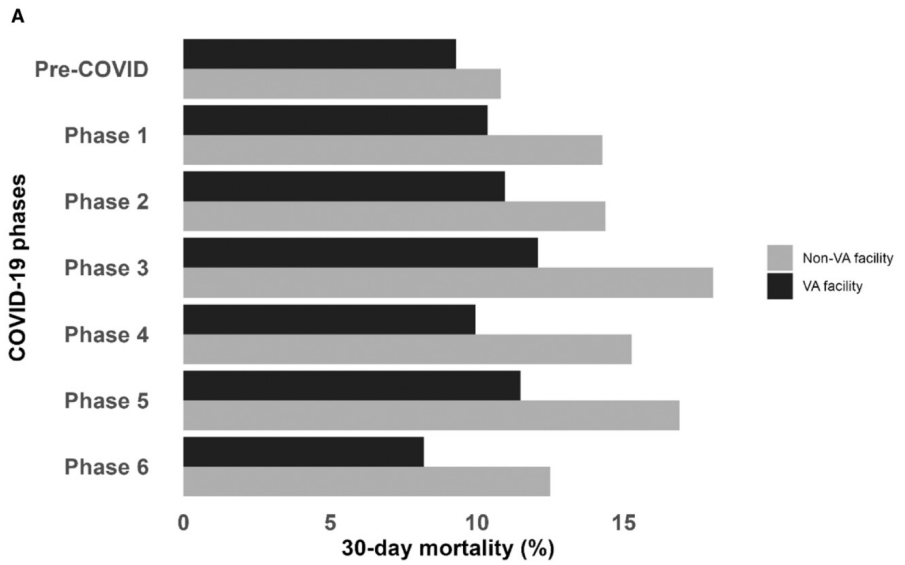

*Yong C et al, Am H Journal. 2021.*

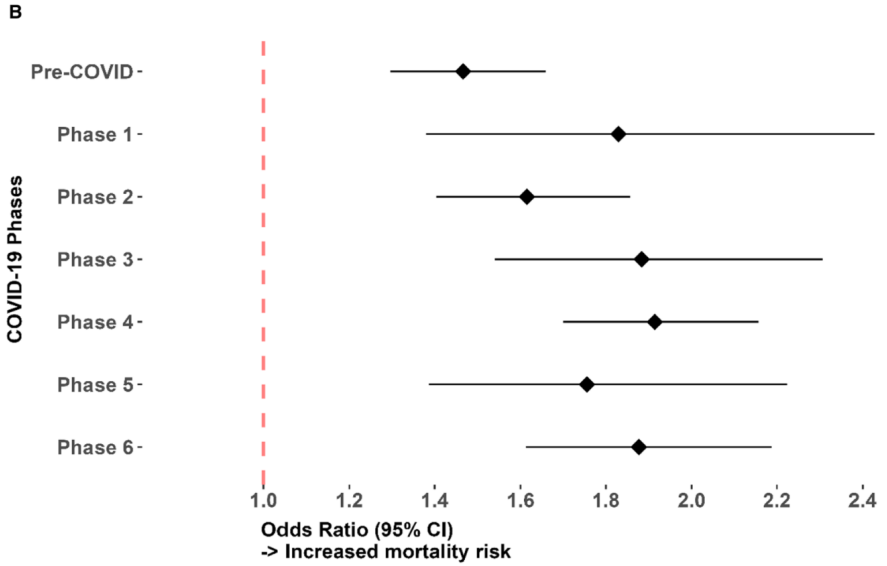
# Myocardial Infarction across COVID-19 Pandemic Phases: Insights from the VAHCS






*Yong C. JAHA. 2023*




# Why did Veterans have improved survival?



*Yong C. JAHA. 2023*

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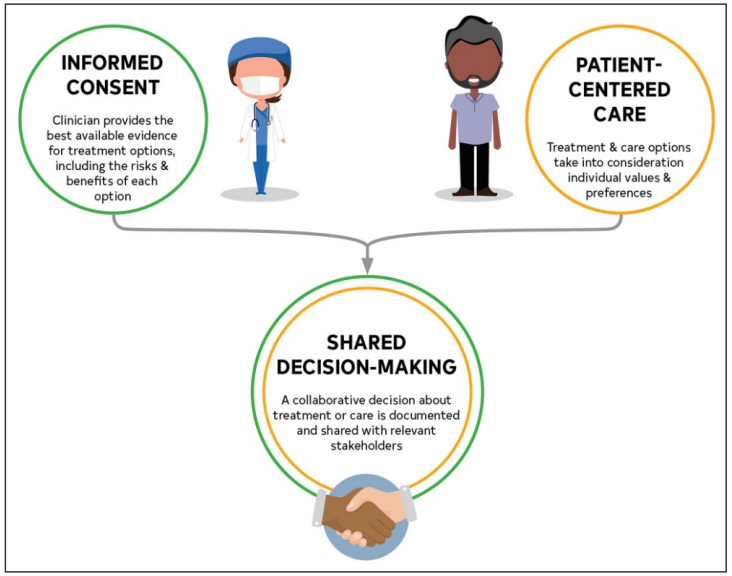
https://doi.org/10.1161/CIR.0000000000001038

ACC/AHA/SCAI CLINICAL PRACTICE GUIDELINE

# 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

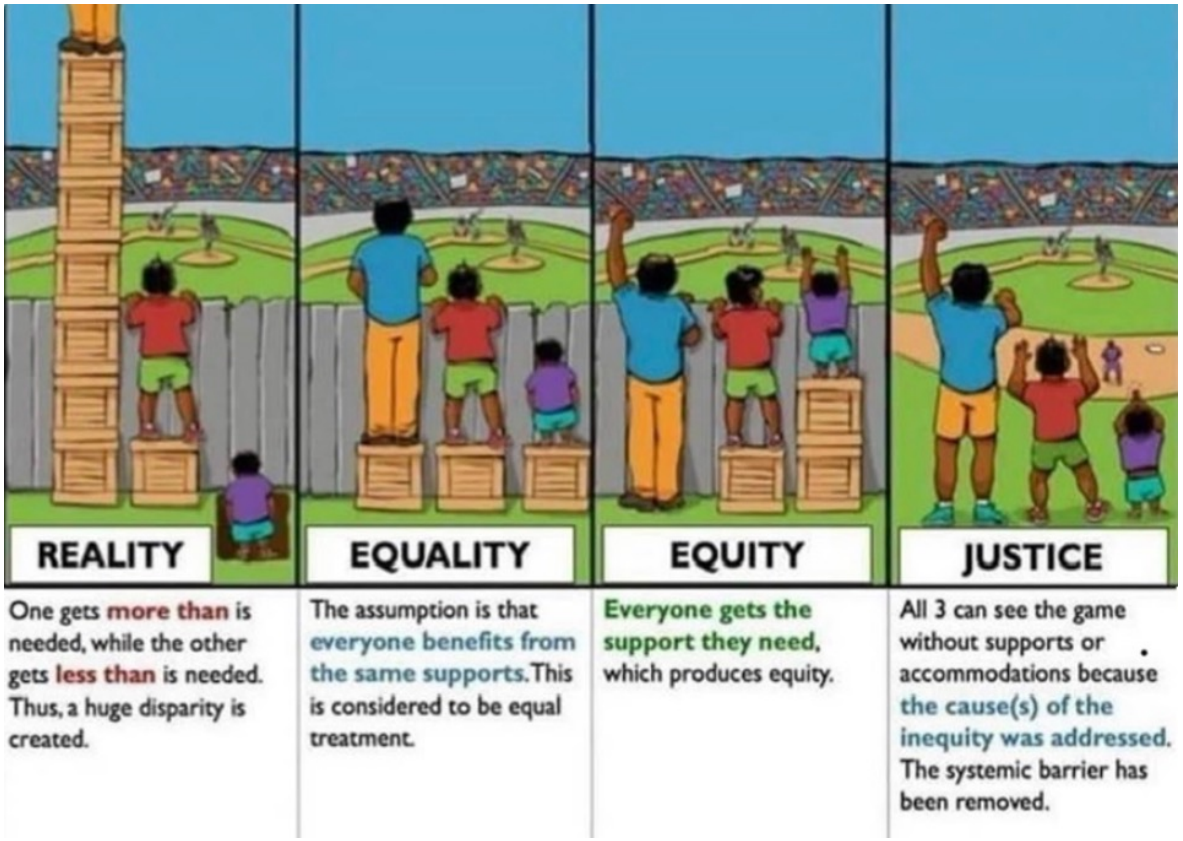
**Jennifer S. Lawton, MD, FAHA, Chair, Jacqueline E. Tamis-Holland, MD, FAHA, FACC, FSCAI, Vice Chair, Sripal Bangalore, MD, MHA, FACC, FAHA, FSCAI, Eric R. Bates, MD, FACC, FAHA, Theresa M. Beckie, PhD, FAHA, James M. Bischoff, MEd, John A. Bittl, MD, FACC, Mauricio G. Cohen, MD, FACC, FSCAI, J. Michael DiMaio, MD, Creighton W. Don, MD, PhD, FACC, Stephen E. Fremes, MD, FACC, Mario F. Gaudino, MD, PhD, MSCE, FACC, FAHA, Zachary D. Goldberger, MD, FACC, FAHA, Michael C. Grant, MD, MSE, Jang B. Jaswal, MS, Paul A. Kurlansky, MD, FACC, Roxana Mehran, MD, FACC, Thomas S. Metkus Jr, MD, FACC, Lorraine C. Nnacheta, DrPH, MPH, Sunil V. Rao, MD, FACC, Frank W. Sellke, MD, FACC, FAHA, Garima Sharma, MD, FACC, Celina M. Yong, MD, MBA, MSc, FSCAI, FACC, FAHA, and Brittany A. Zwischenberger, MD**



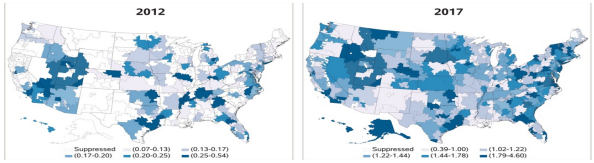

## Top 10 Take-Home Messages

1. Treatment decisions regarding coronary revascularization in patients with coronary artery disease should be based on clinical indications, regardless of sex, race, or ethnicity, because there is no evidence that some patients benefit less than others, and efforts to reduce disparities of care are warranted.

# Moving from reality to justice



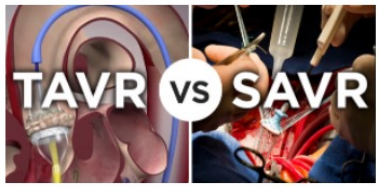
# Challenges to decision making with novel cardiovascular procedures

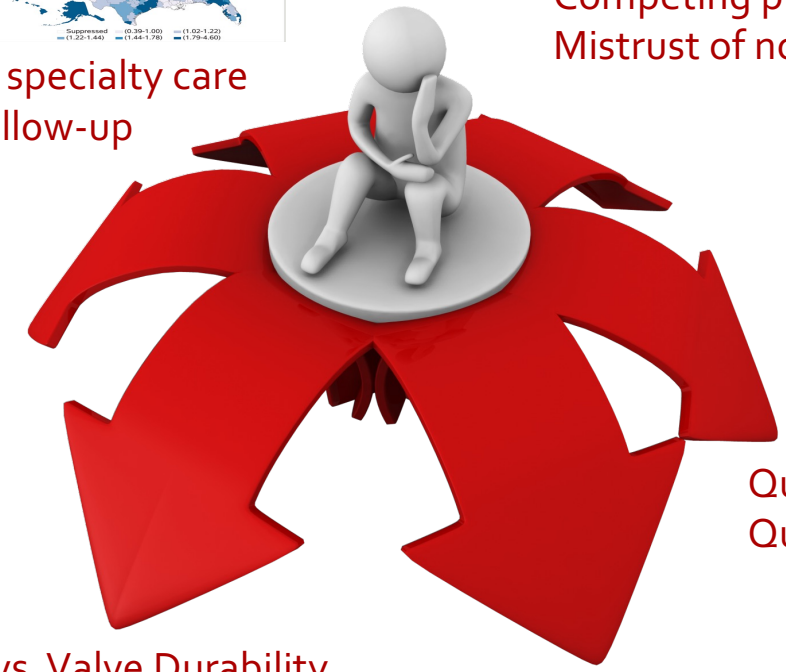



Access to specialty care
Cost of follow-up

Competing professional advice
Mistrust of novel procedures

Multiple Procedural &
Non-Procedural Options



Quantity of Life
Quality of Life

Life Expectancy vs. Valve Durability

Severity of disease vs.
Competing Comorbidities

# We rely on randomized clinical trials to inform how we guide our patients……

VIEWPOINT

**Celina M. Yong, MD, MBA, MSc**
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**William F. Fearon, MD**
Division of Cardiovascular Medicine and Cardiovascular Institute, Stanford University, Stanford, California; and Veterans Affairs Palo Alto Healthcare System, Palo Alto, California.

## Underrepresentation of Women in Revascularization Trials

**One could argue** that the most shocking finding across decades of large clinical trials that deeply investigate coronary revascularization is that women are still poorly represented in them. Cardiovascular disease (CVD) is the number 1 cause of death among both men and women in the US, yet decades of cardiovascular clinical trials have persistently enrolled a predominantly male population. Among all types of cardiovascular trials, coronary revascularization trials rank at the bottom in terms of representation by sex, with an average of 27% females enrolled across 141 coronary artery disease and 61 acute coronary syndrome trials from 2010 to 2017.[1] Despite recent concerted efforts to improve equity of trial enrollment, revascularization trials face ongoing challenges that deserve specific attention.

The first critical question to address is whether we accurately understand the prevalence of disease among women who compose the eligible pool of candidates for revascularization trials. Based on the most recent American Heart Association Heart Disease and Stroke Statistics, 55.4% of all patients with acute coronary syndrome and coronary artery disease in the US are women.[2] At face value, this suggests that women should represent at least half of all patients included in revas-

clinical trials are currently performed, arguing for the value of outreach beyond traditional recruitment sites as a vital step to close the gap.

Beyond the impact of a limited pool of eligible female participants and specific site characteristics, the path to successful enrollment of women narrows further after overlaying the unique barriers facing women at the patient level. Decreased enthusiasm among practitioners for randomizing women may stem from concerns that women tend to be older with more comorbidities and a higher rate of complications compared with men receiving PCI.[6] On the patient side, women may also juggle increased burdens of childcare and family responsibilities that limit their ability to comply with demanding follow-up requirements and potentially even influence their risk aversion. Although some trials reimburse patients, this is often insufficient to cover both the actual and the opportunity costs associated with participation, leading to additional disproportionate barriers. Even when this is not the case, implicit bias may lead to the perception that a female candidate may not be appropriate. More research to understand the perspectives of women patients and their practitioners is needed

Cardiac Interventions TODAY

September/October 2023

**What Are Three Keys to Improving Equity in Cardiac Clinical Trials?**

Leaders in cardiac clinical trial research offer their thoughts on how to support and progress the efforts to increase equity among clinical trials.

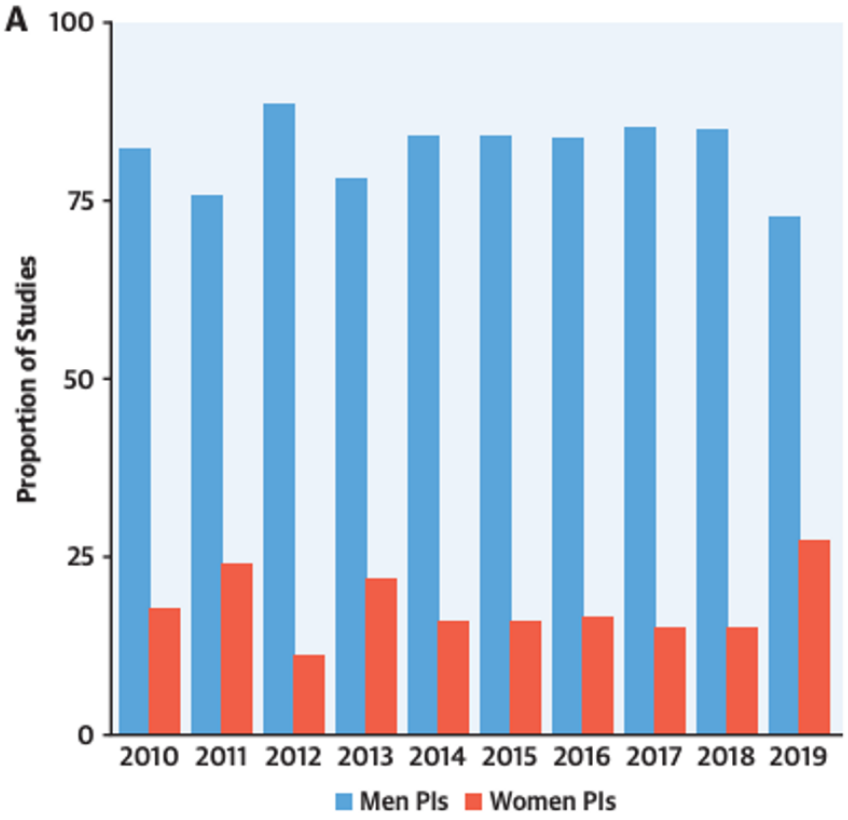
*With F. Aaysha Cader, MD, MRCP, MSc, FACC, FSCAI; Marion Mafham, MBChB, FRCP, MD; Megan Coylewright, MD, MPH, FSCAI, FACC; and Celina M. Yong, MD, MBA, MSc*

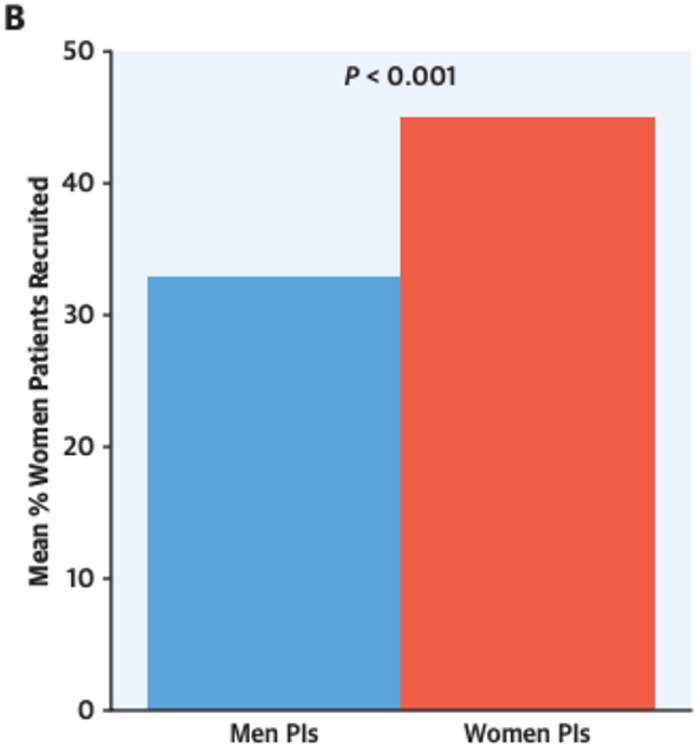
1. Go where the patients are
2. Diversify the principal investigators
3. Alignment across the clinical trial spectrum



*Yong CM, Fearon W. JAMA C, 2024.*

# Temporal Trends in Gender of Principal Investigator and Patients in Cardiovascular Clinical Trials






*Yong CM, et al. JACC, 2023.*

FELLOWS-IN-TRAINING & EARLY CAREER PAGE

# Breaking the Catheterization Laboratory Ceiling

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We can start by examining the stage at which gender differences start to prominently emerge on the 11+ year training path to becoming an interventionalist. By the time an average medical trainee reaches the point in her career at which she must decide whether to pursue interventional cardiology, she is typically 33 to 35 years old. At the age of 35, women are officially termed "AMA" (which in this case stands for "advanced maternal age"). For many, who initially postpone childbearing to focus on their lengthy medical training, the harsh reality hits that if they want to have children at all, the window is quickly closing. Not only does the chance of becoming pregnant begin to diminish rapidly, but the risks of preg-



*Yong CM, et al. JACC, 2017.*

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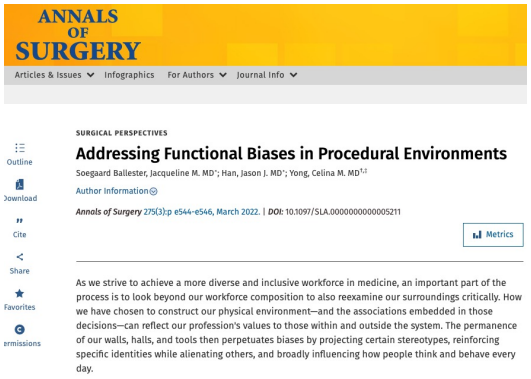
*Yong CM, et al. JACC Interventions 2019.*



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SURGICAL PERSPECTIVES

## Addressing Functional Biases in Procedural Environments

Soegaard Ballester, Jacqueline M. MD*; Han, Jason J. MD*; Yong, Celina M. MD†,‡

Author Information

*Annals of Surgery* 275(3):p e544-e546, March 2022. | DOI: 10.1097/SLA.0000000000005211

Metrics

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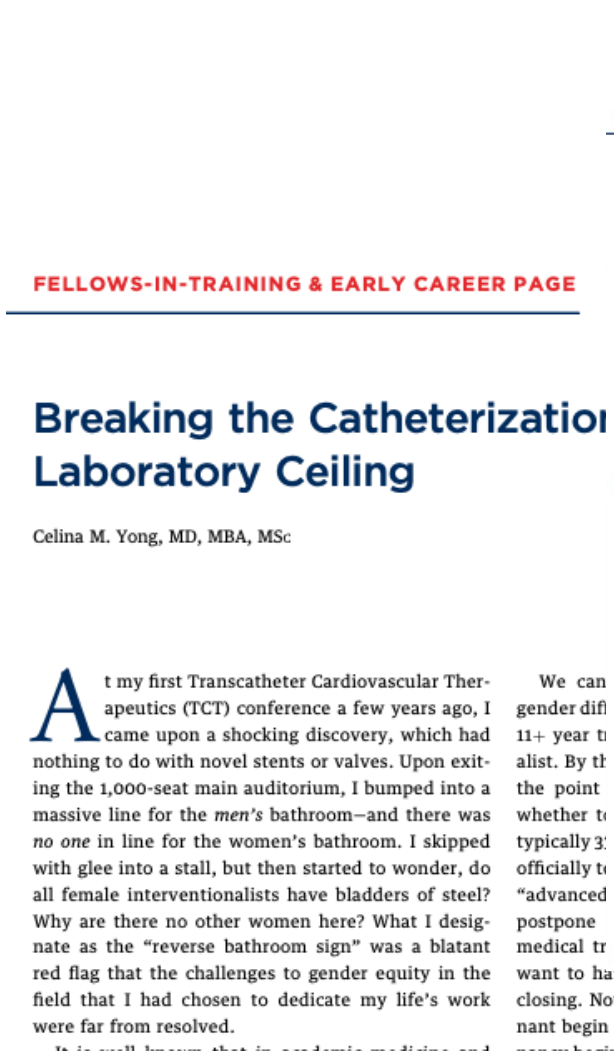
As we strive to achieve a more diverse and inclusive workforce in medicine, an important part of the process is to look beyond our workforce composition to also reexamine our surroundings critically. How we have chosen to construct our physical environment—and the associations embedded in those decisions—can reflect our profession's values to those within and outside the system. The permanence of our walls, halls, and tools then perpetuates biases by projecting certain stereotypes, reinforcing specific identities while alienating others, and broadly influencing how people think and behave every day.



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*Ballester S,…Yong CM. Annals of Surgery, 2022.*

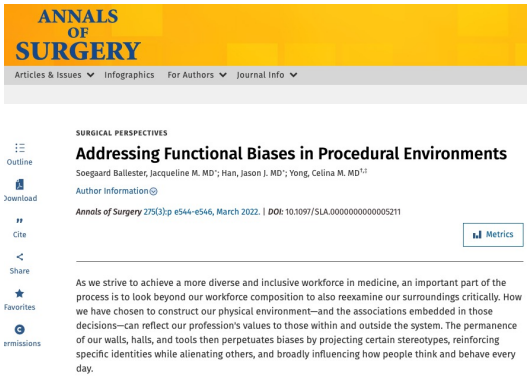
**Journal of the American Heart Association**
Volume 13, Issue 1, 2 January 2024
https://doi-org.laneproxy.stanford.edu/10.1161/JAHA.123.030255

RESEARCH LETTER

# Impact of Virtual Interviewing on Cardiovascular Fellowship Applicant Diversity: Insights From 2 Academic Programs

Celeste Witting, MD ; Joshua W. Knowles, MD, PhD ; Doreen DeFaria Yeh, MD; Tariku J. Beyene, PhD ; Santosh E. Gummipundi, MS ; Paul A. Heidenreich, MD ; Celina M. Yong, MD, MBA, MSc

Cardiovascular training programs matriculate a disproportionately low number of women and underrepresented in medicine (UIM) trainees, with only 21% female, 4.5% Black, and 7% Hispanic fellows reported in recent years.[1] With the onset of the COVID-19 pandemic, virtual interviewing replaced in-person interviewing for cardiology fellowship positions across the United States beginning with the 2021 matriculation cycle, with a concomitant 12.5% increase in cardiology fellowship applications per program nationwide.[2] However, little is known about the influence of these changes on the diversity of the interviewee pool.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*Witting C,...Yong CM. JAHA 2024.*

# Pre-procedural barriers to accessing novel treatments for aortic stenosis among racial/ethnic minorities in the VAHCS

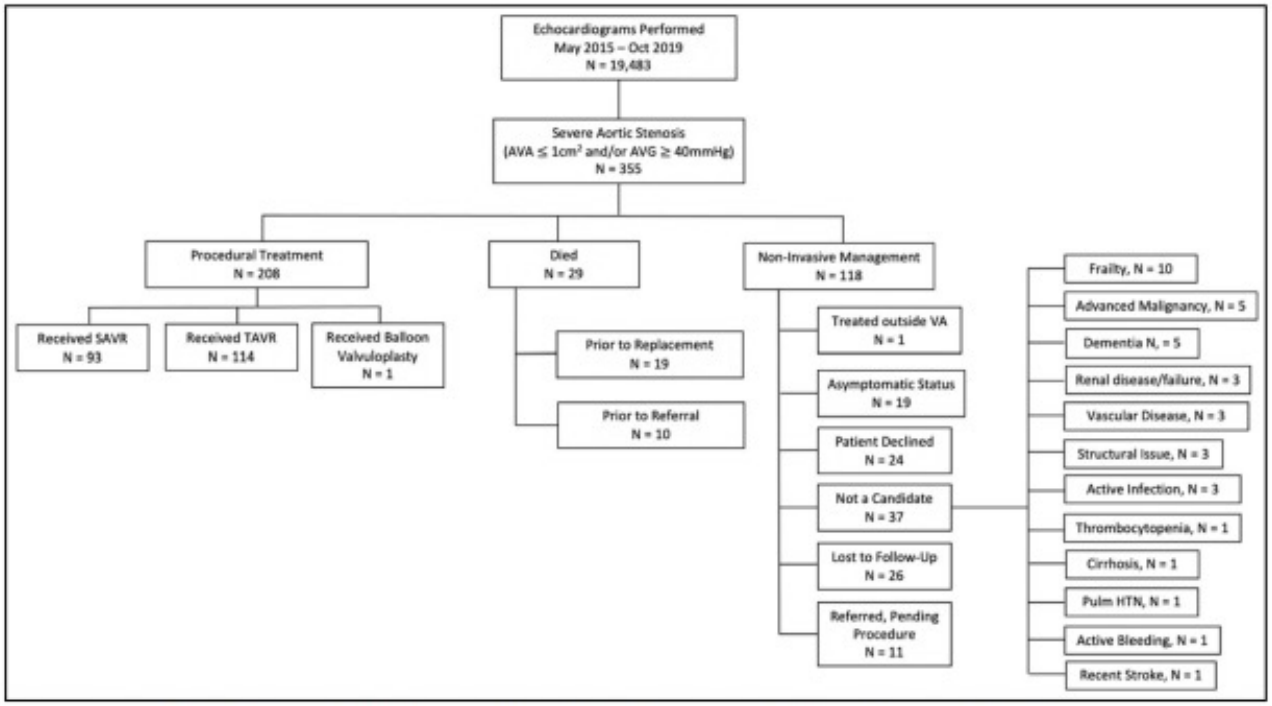


**Fig. 1.** Reasons for Not Undergoing Aortic Valve Replacement in Patients with Severe Aortic Stenosis.



*Kerkar A…Yong CM. Am Heart J Plus, 2021*

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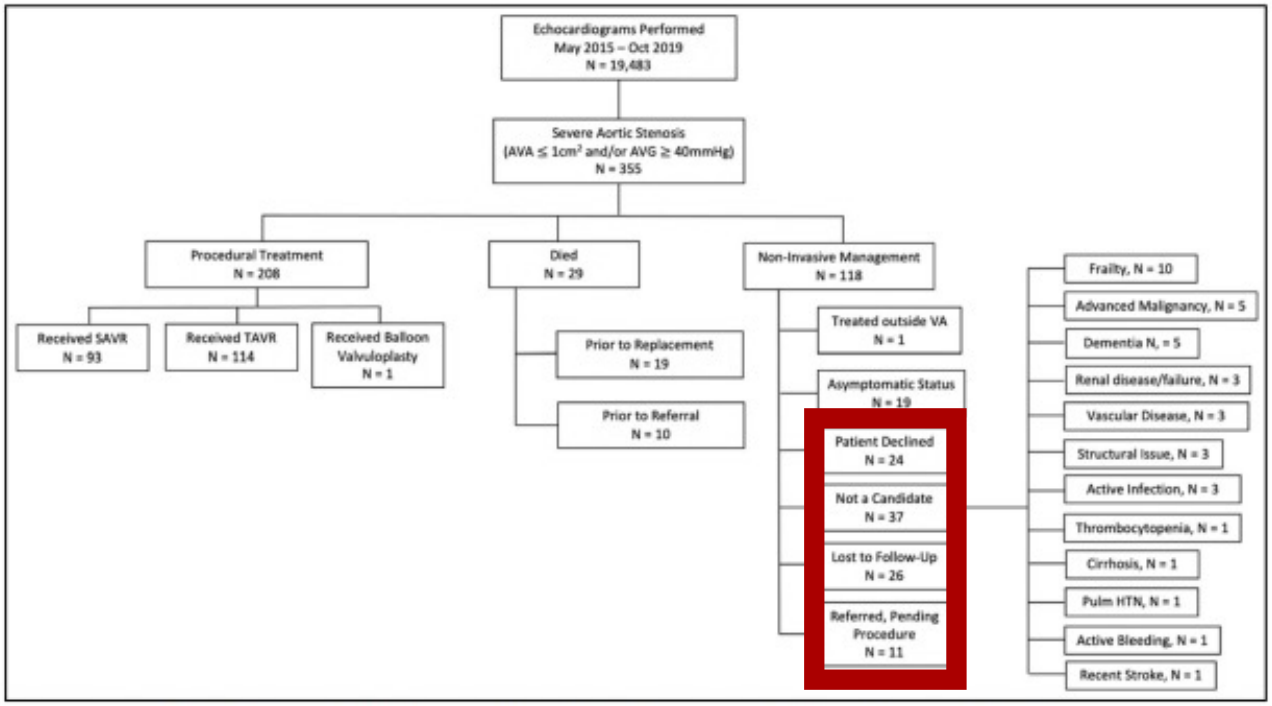


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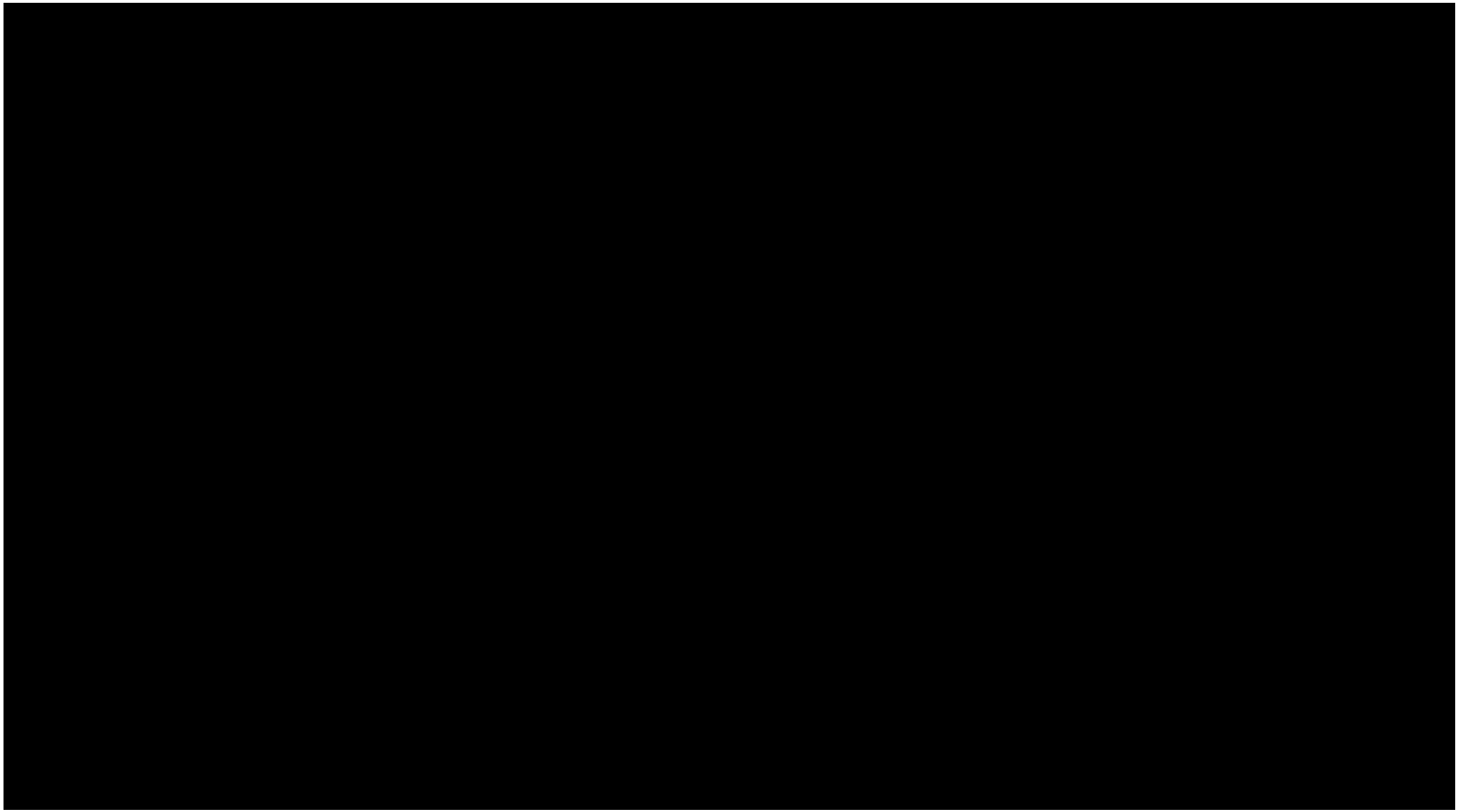
*Kerkar A…Yong CM. Am Heart J Plus, 2021*

# Mismatch between availability of treatment and availability of peer networks who have direct experience with these novel treatments

"My aunt had a TAVR, so I think it's the right choice for me."

"Well I don't know anyone who's had this before, so I'm not sure…"



# A novel noninvasive method for remote heart failure monitoring: the EuleriAn video Magnification apPLications In heart Failure studY (AMPLIFY)

Unedited Video of Internal Jugular

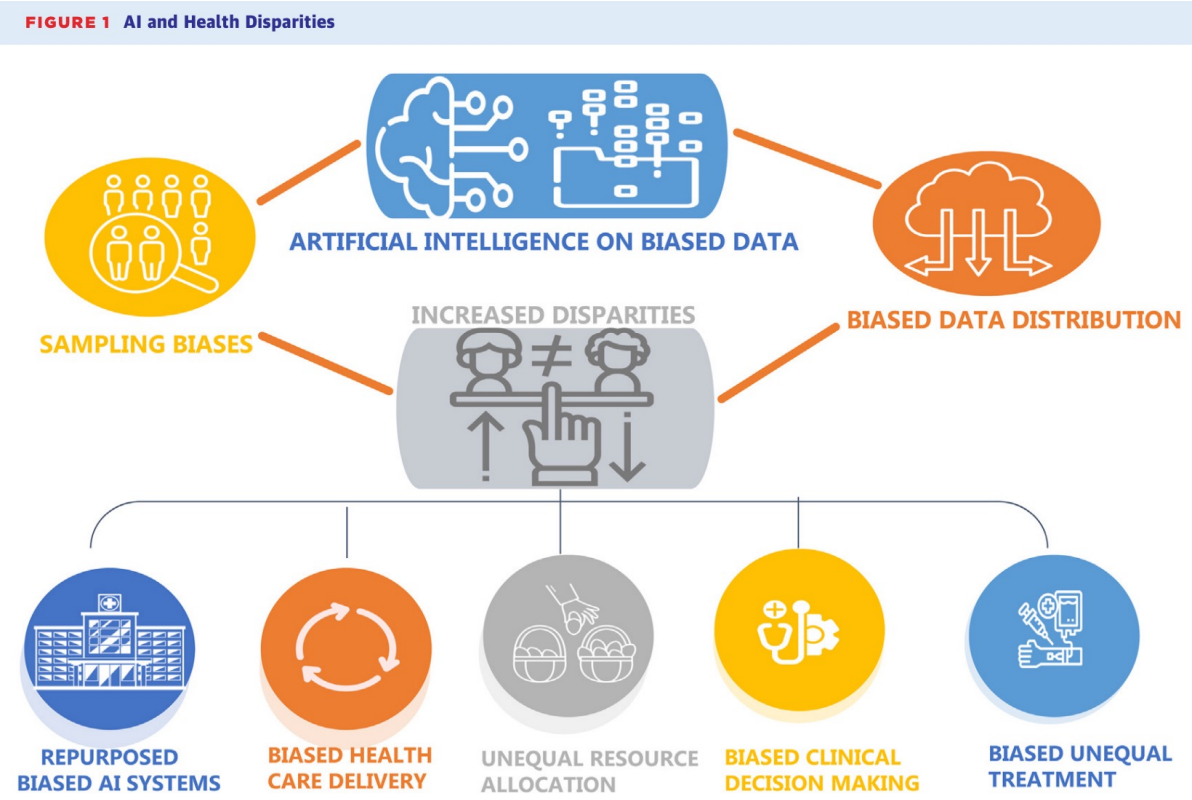
Magnified Video of Internal Jugular




*Abnousi F.... Yong CM. Nature Digital Med, 2019*

# The Role of Artificial Intelligence in Cardiovascular Health Disparities

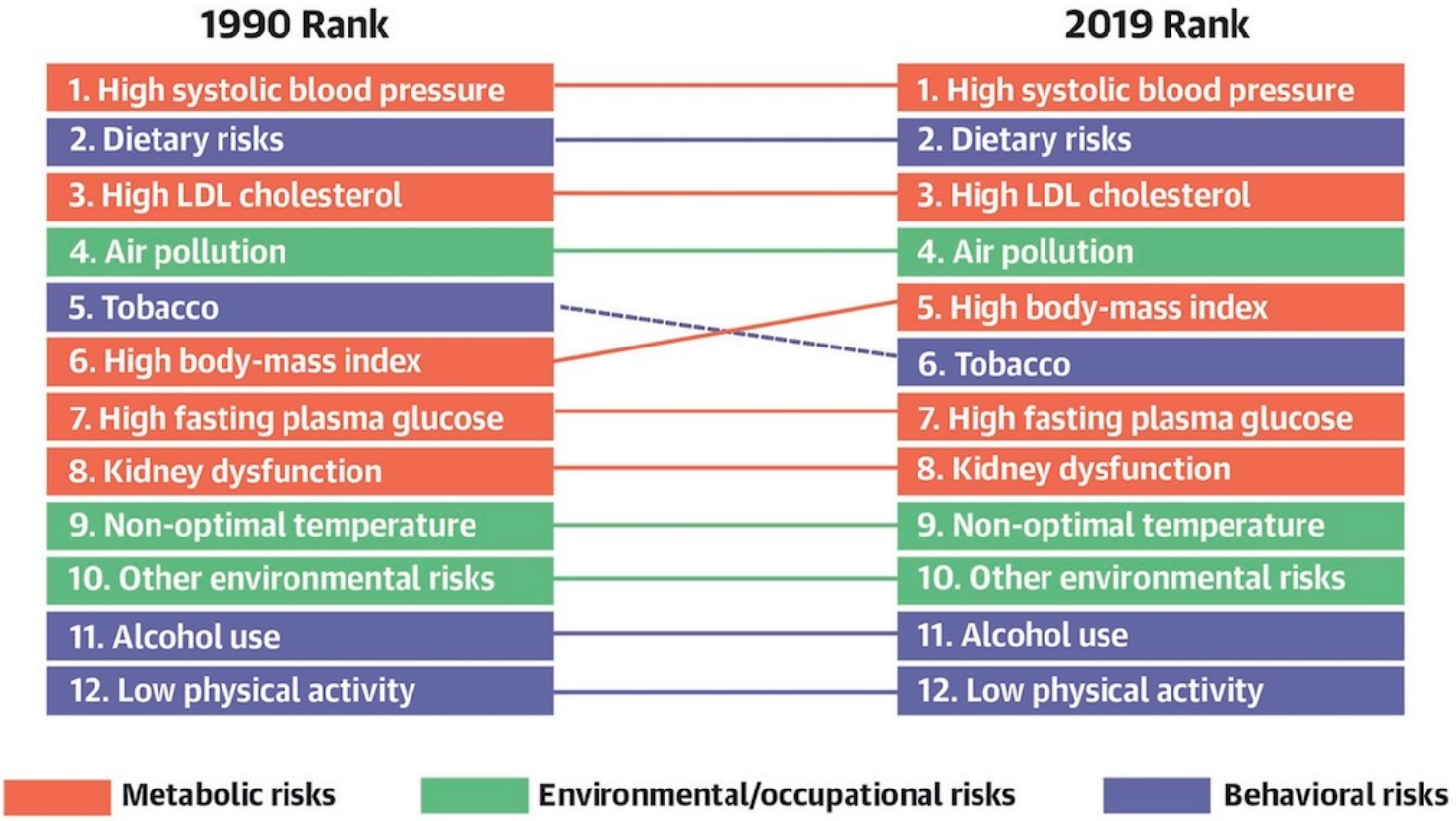
*The Risk of Greasing the Slippery Slope*






*Thamman R, Yong CM, et al. JACC Adv, 2023.*

# Risk Factors for CVD have not changed much over 30 years






*Roth GA et al. JACC, 2020*

# The Streetlight Effect

THE PRESENT AND FUTURE

JACC STATE-OF-THE-ART REVIEW

# Assessing and Addressing Social Determinants of Cardiovascular Health

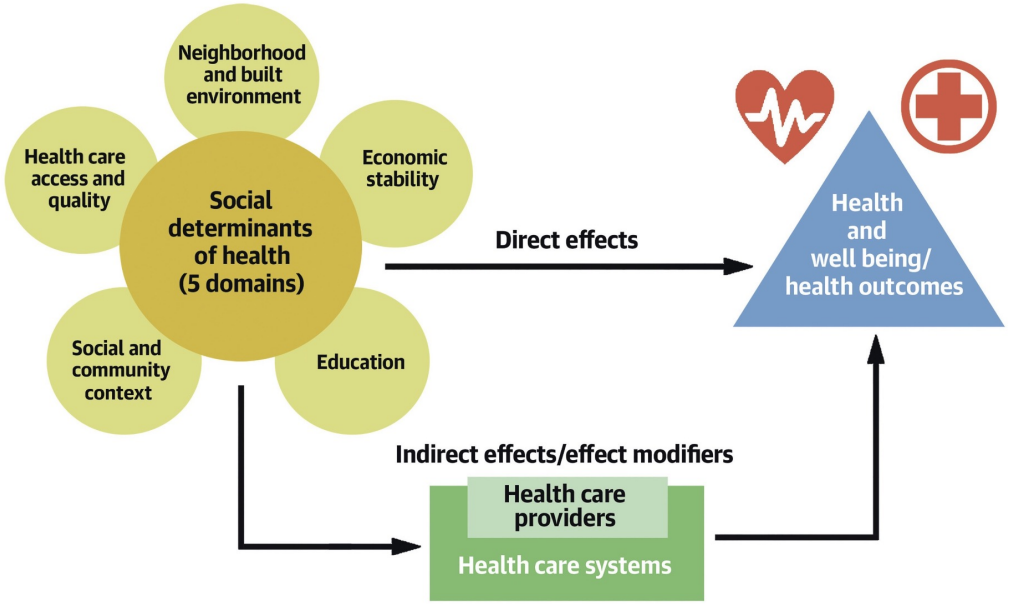
## *JACC* State-of-the-Art Review

Eric J. Brandt, MD, MHS,[a,b,*] Kardie Tobb, DO, MS,[c,*] Julia C. Cambron, MD,[d] Keith Ferdinand, MD,[e] Paul Douglass, MD,[f] Patricia K. Nguyen, MD,[g,h] Krishnaswami Vijayaraghavan, MD,[i] Sabrina Islam, MD, MPH,[j] Ritu Thamman, MD,[k] Shahid Rahman, MD,[l] Akshay Pendyal, MD, MHS,[m] Nishtha Sareen, MD, MPH,[n] Celina Yong, MD, MBA,[g,h] Latha Palaniappan, MD, MS,[g] Uzoma Ibebuogu, MD,[o] Andrew Tran, MD, MS,[p] Adrian M. Bacong, PhD, MPH,[g] Gina Lundberg, MD,[q] Karol Watson, MD, PhD[r]

**ABSTRACT**

Social determinants of health (SDOH) are the social conditions in which people are born, live, and work. SDOH offers a more inclusive view of how environment, geographic location, neighborhoods, access to health care, nutrition, socioeconomics, and so on are critical in cardiovascular morbidity and mortality. SDOH will continue to increase in relevance and integration of patient management, thus, applying the information herein to clinical and health systems will become increasingly commonplace. This state-of-the-art review covers the 5 domains of SDOH, including economic stability, education, health care access and quality, social and community context, and neighborhood and built environment. Recognizing and addressing SDOH is an important step toward achieving equity in cardiovascular care. We discuss each SDOH within the context of cardiovascular disease, how they can be assessed by clinicians and within health care systems, and key strategies for clinicians and health care systems to address these SDOH. Summaries of these tools and key strategies are provided. (J Am Coll Cardiol 2023;81:1368–1385) © 2023 the American College of Cardiology Foundation. Published by Elsevier. All rights reserved.

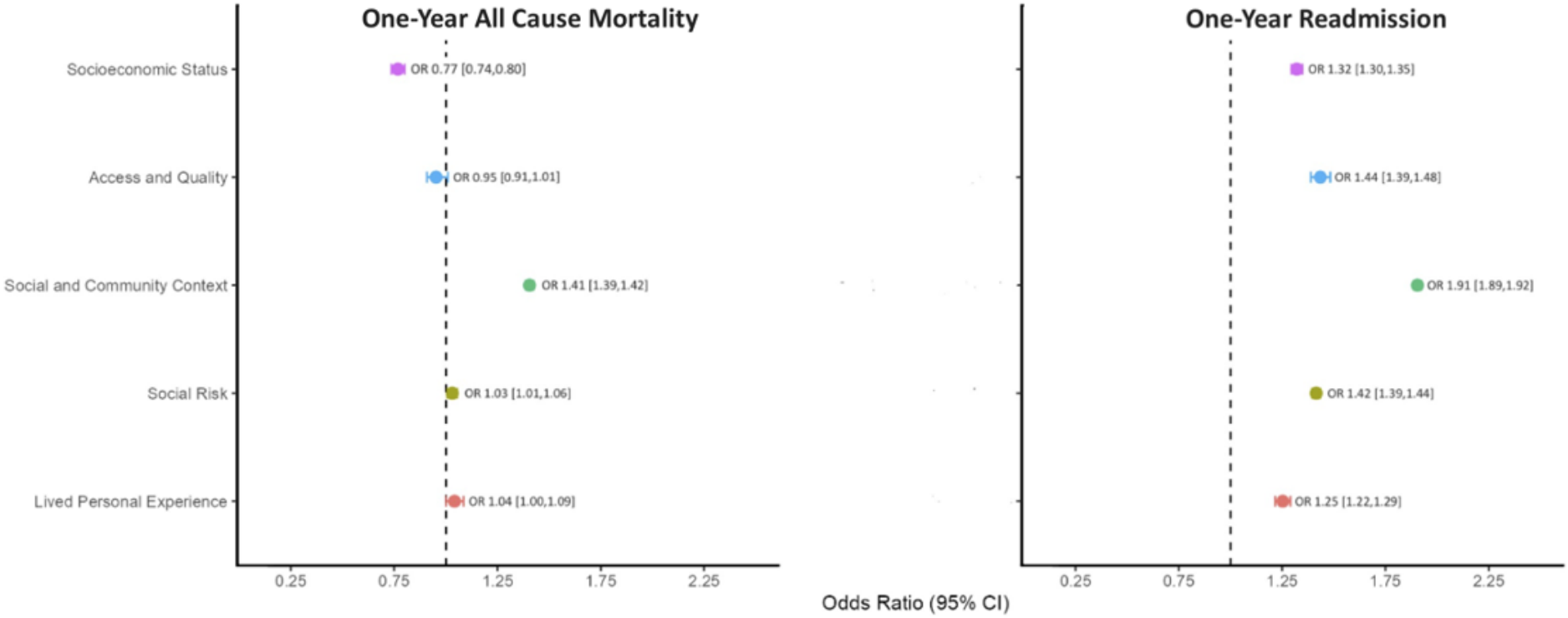
**CENTRAL ILLUSTRATION: Impact of Social Determinants of Health on Health Through Health Care Providers and Systems**




Brandt EJ, et al. J Am Coll Cardiol. 2023;81(14):1368–1385.

# Novel Use of Z Codes to Identify Social Determinants of CVD Outcomes

*Health Related Social Needs Associated with 1-Yr Mortality and Readmission*






*Song N,…Yong CM. ACC 2024.*

# Emerging lessons from the VAHCS

*It's not just about statistics*

There is real power in understanding Veteran journeys at scale.

While the pandemic exacerbated cardiovascular inequities, novel technologies may allow us the ability to overcome them if used appropriately.

We are underestimating the value of social support in health outcomes.

# Summary and Next steps

- Rapidly changing U.S. demographics and procedural advances make achieving health equity an increasingly complex problem, with further setbacks from the pandemic.
- Despite tremendous advantages of novel technology and artificial intelligence, there is a risk that it widens disparities in care.
- More research into how we can identify and address the most impactful barriers for Veterans is critical. The VAHCS is uniquely poised to address these problems.

# Thank you


**Mentors & Collaborators:**
Paul Heidenreich
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Karim Sallam
Alex Sandhu
Roxana Mehran
Harlan Krumholz
Robert Harrington
Claire Duvernoy

**Statistician:**
Tariku Beyene

**Research Coordinator:**
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Kaylin Nguyen
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Daniel Amponsah

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Balu Pillai
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Celeste Witting
Shirin Sadri
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Aashna Suvarna

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