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## 2022 Symposium Presentation

# Racial Variations in Shock Presentation and Outcome

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## Abstract

Working toward inclusive strategies for data sampling, trials, and triage is essential. Whatever the approach, it is important to do better than what has been done in the past when considering race and ethnicity in patient care. Although there may be limited publications with information on this topic, they have shown clear differences in patient outcomes with possible associations with gender, race, and ethnicity. It is critical to view the implications of this on socioeconomic status, access, resources, patient phenotypes, and patient desires and expectations. The disparities must first be recognized before any treatment options can be identified.

**Keywords:** racial variation, cardiogenic shock, outcome

## Background

Discussing racial variation is difficult when our understanding of cardiogenic shock is evolving. Based on retrospective data, we know disparities exist. Patient demographics such as race, ethnicity, sex, and socioeconomic status are important determinants of health care, access, delivery, and outcomes. Significant racial and sex disparities have been documented in patients with heart failure, stroke, acute myocardial infarction, and transcatheter aortic valve replacement (TAVR). Further evaluation of access, quality of care, and health system biases is essential and requires investigation as, at present, their impacts are uncertain.

### TAVR and Shock Stages

According to the Woodlands data, a key area of care that is costly but has a high impact is TAVR treatment.<sup>1</sup> Most individuals undergoing TAVR are Medicaid-funded, which is typical of cardiogenic shock, but they are not in communities or regions with a high concentration of Black or Hispanic individuals. It is important to consider how we categorize individuals, phenotype severity, risk, etc. This is even more true when we talk about race and ethnicity.

We understand that mortality risk rates depend on the patient's ranking in the Society for Cardiovascular Angiography and Interventions (SCAI) stage of shock. It is important to note the differences between where non-White patients present and their assessment. In terms of outcomes, some questions to consider are:

- How precise is our assessment of shock among physicians?
- How good are physicians at assessing shock?
- Do patients present with different shock phenotypes based on race and ethnicity?

We can make assumptions, but the data to support these assumptions is unavailable.

There are three programs with variable interpretations and assessments of the SCAI stages of shock.<sup>1</sup> This complicates patient assessment when we bring race and ethnicity into the equation. The data from these programs do not reflect the differences in assessment based on race and ethnicity, and this is a subject that should be addressed. However, it is important to note that data may identify some

phenotypes that are associated with mortality. Using artificial intelligence could be an interesting approach to patient assessment.

## The Data

Based on retrospective data from 2012 to 2017 on cardiogenic shock, another part of the population that must be considered is the race category of *other*—many of whom cross-identify as Black. In 2020, 12% of Americans self-identified as Black, and 14% identified as a mixed race, including being Black. When looking at national inpatient samples (NIS) of multiorgan failure, respiratory failure, hepatic failure, renal failure, and need for dialysis, Black and Hispanic individuals have the highest risk defined by phenotype.

Dhruva et al. reported that medical therapy use was lower by a small but significant margin in African American individuals and those identifying as *other* race categories.<sup>2</sup> Use of the microaxial left ventricular assist device was the same or higher in those same categories than among individuals self-identifying in the White category. The same trend was true for other mechanical therapies, indicating differences in usage among racial groups. This begs the question: is more mechanical support being used because this population is genuinely sicker?

Randomized data on outcomes exists through the National Cardiovascular Data Registry (NCDR) and administrative databases, but these data often underrepresent categories that are non-White race and ethnicity. The trial populations are also small, typically including a couple hundred patients. In a 2016 publication from NCDR, only 7% of enrolled patients self-identified as Black.

Retrospective data from the Mayo Clinic is available with trial populations of several thousand patients.<sup>3</sup> With this large sample size, we can begin teasing out information that reflects access to care and social determinants. The Charlson Comorbidity Index predicts 10-year survival and produces varied results; however, it could be used to evaluate outcomes and risk categories when comparing studies.

Considering interventions for cardiogenic shock, invasive procedures such as angiography, right heart catheterization, hemodialysis, and ventilation were disproportionately lower in non-White men and women.<sup>4</sup> However, noninvasive ventilation was higher in non-White males and females.

In a study over a 15-year period, there was a marked increase in admissions of White men for cardiogenic shock at 37.9%; the increase was not as high in White women at 21.6%.<sup>4</sup> Admission of non-White males and non-White females was 25.5% and 15.0%, respectively. In addition, there

was a significant difference in in-hospital mortality, with a reported 20% increase in non-White male and non-White female groups. Not enough data on out-of-hospital mortality exists.

## NIS Data

The same differences in mortality can be noted when analyzing data focused on patients with acute ST-elevation myocardial infarction. As compared to white men, a nearly 20% difference in Black men and ~30% difference in Black women has been reported.<sup>5</sup> Specifically, mortality was broken down to include the likelihood of revascularization support and right heart catheterization. The relationship between improved mortality in patients who were identified as having right heart catheterization and revascularization should be investigated more closely in future randomized trials that stratify patients by race and sex.

The caveat to this data is that it is from the NIS data bank. The NIS bank draws from a sampling frame that consists of discharge data submitted by partner groups, which means that data from nonpartner groups is missing entirely. Aside from that, data sent by partner groups is sometimes incomplete because of differing state reporting requirements. The sampling frame is also designed to draw from several hospitals that must net to a total of 20% of hospitals nationally. It is in four regions with three categories of hospital ownership, including a category for urban-rural locations, teaching status, and bed size. As a result, it is unlikely that the data from NIS hospitals are representative of all hospitals in the nation.

## Conclusion

Working toward more inclusive strategies for data sampling, trials, and triage might be beneficial. Whatever the approach, it is important to do better than what has been done in the past when considering race and ethnicity in patient care. Although there may be limited publications with information on this topic, they have shown clear differences in patient outcomes with possible associations with gender, race, and ethnicity. It is critical to view the implications of this on socioeconomic status, access, resources, patient phenotypes, and patient desires and expectations. The disparities must first be recognized before any treatment options can be identified.

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