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Editorial

TAVR Use and Outcomes in Minorities: Time for a Wake-up Call

Wayne Batchelor *, Emmanuel Ekanem

Inova Heart and Vascular Institute, Falls Church, Virginia, U.S.A.

* Corresponding author at: Inova Heart & Vascular Institute, 3300 Gallows Road, Suite I-4109, Falls Church, VA 22042.

Transcatheter aortic valve replacement (TAVR) represents one of the most important advances in interventional cardiology within the last decade. Initially reserved for high-risk, non-operative patients, indications have since been extended to moderate-risk patients, and soon, even low-risk patients will be afforded this less invasive therapy for severe symptomatic aortic stenosis (AS) [1–3]. Unfortunately, the promise of TAVR has yet to be fully realized across all racial and ethnic groups; there is growing evidence of treatment disparities in underrepresented minorities. In this issue of *Cardiovascular Revascularization Medicine*, Hernandez-Suarez et al. [4] present the results of a retrospective analysis of the National Inpatient Sample (NIS) database in adult patients who underwent TAVR between 2012 and 2014 (N=36,270). The aim was to examine racial and ethnic disparities in mortality, utilization rates, non-fatal in-hospital adverse outcomes and healthcare costs among non-Hispanic whites, African Americans, and Hispanics. The primary outcome was all-cause mortality. The investigators reported an overall in-hospital mortality rate of 4.2% with no significant difference among racial and ethnic groups. It is important to note that because of the very large sample size, the study was adequately statistically powered to address these mortality comparisons. However, in comparison to non-Hispanic whites, Hispanics were noted to have lower TAVR utilization rates; a higher risk of acute myocardial infarction, stroke/transient ischemic attack, and acute kidney injury; prolonged length of stay, and higher hospital costs. Interestingly, there was no statistically significant difference between African Americans and non-Hispanic whites for any of the aforementioned secondary outcomes. The slower growth of TAVR procedures in Hispanics over the three years of the study in conjunction with these higher rates of in-hospital non-fatal adverse outcomes were striking observations that merit further discussion.

Hernandez-Suarez et al. showed that TAVR rates in Hispanics grew at a slower pace over the three years of study (from 9.4 to 18.2 per million in Hispanics vs. from 9.1 to 26.4 per million in African Americans and from 38.8 to 103.8 per million in non-Hispanic whites). This lower rate of TAVR utilization in minorities falls in line with several previous reports, including observations from the Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapies (STS/ACC TVT) registry [4,5]. This registry showed that the number of TAVRs in the U.S. doubled every year from 2012 through 2014 to nearly 25,000 procedures in 2015 [4]. However, the proportion of TAVR patients who were African American remained persistently low (~4%) throughout this timeframe, and there were no data reported on Hispanic TAVR patients. There are multiple potential reasons for lower rates of TAVR in minorities. Some studies have suggested that the prevalence of AS is lower in minorities, thereby contributing to fewer TAVR procedures [6,7]. However, these echocardiographic prevalence studies themselves are inherently prone to referral bias. While genetics may also play a role, thus far, no racial differences have been observed in the penetrance of single nucleotide polymorphisms that have been associated with AS [8,9] and African Americans and Hispanics tend to have higher rates of diabetes mellitus, hypertension, and hyperlipidemia, each of which have been reported to be predictors of AS. Therefore, we believe that other factors, such as inadequate access to healthcare and advanced cardiac testing and referral and treatment biases, likely account for the lower TAVR rates in Hispanics noted by Hernandez-Suarez et al.

The comparable in-hospital survival reported by Hernandez -Suarez et al. among racial and ethnic groups is reassuring and also consistent with prior studies [10,11]. However, the higher rates of non-fatal in-hospital adverse outcomes, longer length of stay, and higher hospital costs reported for Hispanic patients still raise concern. These incremental risks persisted despite adjustment for baseline imbalances in patient demographics, clinical characteristics, health insurance status, household income, and TAVR access site. It is important to note that transapical TAVR was more often performed in Hispanics (28.2%) than in African Americans (19.6%) and non-Hispanic whites (14.2%). Although TAVR access site was accounted for in the risk adjustment model, given that transapical TAVR has been associated with significantly higher complication rates than the transfemoral approach [12], it is possible that the multivariate model did not fully adjust for this

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bias. With nearly half of the Hispanic patients treated in the Western U.S., and the majority of African American patients concentrated in the Southern U.S., regional variations in care and outcomes may have also influenced the study results. For example, it is possible that the hospitals and operators where Hispanic patients were treated had less TAVR experience, thereby contributing to the differential outcomes [13].

Hernandez-Suarez et al. should be commended for contributing significantly to our understanding of the racial and ethnic health disparities in TAVR. The study's large sample size, which spanned across the U.S., and the "real-world" nature of the data are major strengths. However, not surprisingly, the study raises more questions than it answers. For example, what was the impact of social determinants of health? Given that race and ethnicity are intertwined with socioeconomic and environmental factors, it is quite likely that these factors affected outcomes and length of stay. However, these data were not available. Were minorities less likely to be diagnosed with AS, less likely to be offered TAVR, or more likely to refuse the procedure? How culturally sensitive and language concordant was the communication between the valve team and the Hispanic patient? Until further studies address these questions, the clinical, biologic, and social underpinnings for the increased risk, longer length of stay, and lower TAVR rates in Hispanics remains unknown.

The advent of TAVR for high-risk patients was a major inflection point for the treatment of AS. With recent trials showing favorable safety and efficacy in both intermediate- and low-risk patients [1,3], we are clearly on the verge of another inflection point and major rise in TAVR volumes in the U.S. The question remains as to whether we will be able to meet these increased demands in a manner that results in equal access and outcomes across our diverse population. The sobering results from Hernandez-Suarez et al. suggest that we have a long way to go.

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