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Key Words: TAVR, SAVR, race/ethnicity, disparity, hospital volume

Discussion

Presenter: Dr Brian D. Cohen

Dr Hersh Maniar. Dr Cohen, that was a really—it's a thought-provoking study with regard to access to TAVR and racial disparities. Our invited discussant to open the conversation is Dr Danny Chu from UPMC. Danny, do you want to lead us off with some questions for Dr Cohen?



Dr Danny Chu (Pittsburgh, Pa). Yes. Thank you. I congratulate the team for this well-done and timely study on racial disparity of TAVR utilization and thank the authors for providing me the manuscript well ahead of time for review. I appreciate the association giving me the privilege to discuss this

paper. Dr Cohen and colleagues performed, in retrospective observations, a cohort population-based study of 51,000 patients or so who underwent aortic valve replacement via either a SAVR approach or a TAVR approach from 2013 to 2017 using the administrative State Inpatient Database from 8 states aiming to test their hypothesis that racial disparity in aortic valve replacement procedures has decreased over time as TAVR use has expanded and that this decreasing disparity is driven by the increased utilization at low-volume centers. The team here used the

Charlson Comorbidity Index for risk adjustment and adjusted regression methods to adjust for potential confounding covariants. The authors conclude that the increased TAVR utilization in non-White patients was driven by increased utilization in high-volume centers. I have a few questions for you, and I will be asking them one at a time. Number one, it was not clear from the manuscript whether your cohort included only isolated primary nonredo aortic valve replacements. What are your exclusion criteria for this particular study?



Dr Brian D. Cohen (Washington, DC).

Great. Thank you very much, Dr Chou, and thank you for the clarifying question. Our inclusion criteria included any Medicare beneficiary who underwent TAVR or SAVR over our time period of interest. We then excluded anybody with aortic valve insufficiency on the basis of ICD code. We chose this cohort, specifically those of Medicare, to focus on a patient population that was largely approved to undergo TAVR during our time period of interest and tried to mitigate any confounding effects of insurance status as much as possible. We did not include or exclude patients on the basis of concomitant procedures or have the data to determine native valve versus redo operations. This was one of the limitations of using the State Inpatient Databases, given the constraints of data collection and inconsistencies in how some might code primary versus secondary procedures. More fundamentally, we were interested in describing dissemination trends of this transformational technology. And so, while there's certainly important differences in indications among these different categories, we were looking at the top-line numbers of TAVR versus SAVR over time and how they may change.

Dr Chu. Right. Number two, your manuscript described exclusion of patients with aortic valve insufficiency. What did the patient have next, aortic stenosis, aortic insufficiency? Were these patients excluded? How would this change your results and/or conclusions?

Dr Cohen. Yes. So, we did exclude patients with aortic valve insufficiency on the basis of their ICD codes. However, when excluding patients, we didn't dive deeper into primary versus secondary diagnoses, similar to before, as a limitation of how someone might code primary versus secondary diagnoses in State Inpatient Databases. So, if a patient carried both diagnoses, they would've been excluded with that method, and again, on the basis of limitations of data collection. To answer your question more specifically, how it would change our results and provide some numbers, we did exclude 4600 patients with aortic valve insufficiency. And then going back to look over some of the secondary diagnoses, 625 carried the diagnosis of aortic stenosis and that being compared with >51,000 that were

included for the analysis. So, I don't think it would've had a substantial effect one way or the other given the numbers but do recognize that it's a limitation of the data set.

Dr Chu. Great. One of the contraindications for TAVR is aortic valve endocarditis. Did you exclude endocarditis patients? If not, might this partly explain your findings?

Dr Cohen. Right. So, we did not exclude patients with endocarditis. To the extent that racial minorities are at increased risk of endocarditis, it would favor SAVR over TAVR as you pointed out. However, the literature shows ethnorracial minorities less likely to undergo SAVR compared with their White counterparts, and specifically, that remains true after presenting with endocarditis. So, I think, while your question is obviously important and provides another example of disparate access to surgical care, I don't believe it could be used to explain our findings as I can't say that non-White patients aren't getting TAVR because they're all getting SAVR when that isn't the case on the basis of existing literature.

Dr Chu. Number four, you demonstrated that disparate access to TAVR technology is still persistent albeit less so in the current era for non-White patients. What do you suggest is the rationale behind this disparity? Is it an access issue or inherent patient-level differences?

Dr Cohen. So that is the fundamental question that drives this work, drives a lot of similar work that doesn't have a simple answer. What we've provided was a highly descriptive analysis trying to quantify patterns of dissemination of this new technology. To do that, we designed it as our 3-way interactions to see if inequity was changing over time. We saw it was decreasing, and we introduced hospital volume as one area to try to key in on where those changes were happening finding that it decreased on the basis of increased use at high-volume hospitals. That said, more to your question and more fundamentally, racial disparity in medicine is multifactorial and broader than just who has access to these high-volume hospitals. This study doesn't address patient-related factors, cultural or social differences in who seeks care, who agrees to surgery, it doesn't delve deeper into

provider- or system-level factors such as referral pathways or reimbursement incentives, and we actively sought to minimize the effects of payer status looking only at Medicare beneficiaries. So that was what we tried to do and what we weren't able to do, but what we showed was it provided a window into these patterns of dissemination and how those patterns are changing, how the dissemination is changing.

Because ethnorracial minorities historically have less access to high-volume hospitals, there is some reasonable thought that increasing TAVR use at low-volume hospitals would have alleviated some disparity, but data that we have doesn't support that hypothesis. By showing the decreasing racial disparities was driven by high-volume hospitals, hopefully, this helps provide a better target for future investigation, future interventions. If the goal is to reverse ethnorracial disparity, looking at those patient-related factors, looking at the referral pathways, looking at all the other factors to drive more equitable use within high-volume hospitals is a reasonable target on the basis of these data.

Dr Chu. My final question is, number five, please comment on the validity of risk adjustment for cardiac surgical procedures using the Charlson Comorbidity Index with ICD-9 or 10 diagnosis codes. Again, I thank the AATS for the privilege to discuss this fine paper. Thank you.

Dr Cohen. Thank you. And we did use the Charlson Comorbidity Index as a standard when using these large data sets, the State Inpatient Database as well as using the nationwide inpatient sample. There is evidence looking specifically at its use in minimally invasive mitral valve surgery showing it has a predictive value not significantly different from STS or EuroSCORE II, but there is more substantial evidence of its value for nonsurgical cardiac disease or general thoracic surgery as well. In our case, we used it as a standard tool that was associated with our data set though. And thank you, Dr Chu. I appreciate you serving as our discussant and asking these great questions.

Dr Chu. Thank you.