JSCAI

The official journal of the Society for
Cardiovascular Angiography & Interventions

Editorial

Patient Selection in Transcatheter Aortic Valve Replacement: With Great Power Comes Great Responsibility

Robert N. Piana, MD *, Angela M. Lowenstern, MD, Bassim R. El-Sabawi, MD

Division of Cardiovascular Medicine, Vanderbilt University Medical Center, Nashville, Tennessee

The emergence of transcatheter aortic valve replacement (TAVR) has equipped interventional cardiologists and cardiac surgeons with great power. Most patients with symptomatic, severe aortic stenosis (AS) are older adults with multiple comorbidities; historically, at least one-third of these patients have not been deemed suitable candidates for surgical aortic valve replacement (SAVR).[1] TAVR has now empowered physicians to dramatically expand the treatment options for patients at prohibitive or high surgical risk and, more recently, to offer this technology appropriately to those at intermediate or even low risk. In this setting, the annual number of TAVR procedures in the United States now exceeds that of SAVR.[2]

These capabilities also mandate great responsibility in applying this novel approach to the correct patient population to optimize outcomes. Determining the suitability of TAVR for an individual patient requires a nuanced assessment of multiple critical factors including the presence of symptoms, estimated survival, comorbidities, frailty, morphology of the aortic valve and aorta, presence of other valvular heart disease or heart failure, coronary anatomy, and vascular access. A heart team approach is therefore recommended for this complex assessment, and the Centers for Medicare & Medicaid Services mandates that an interventional cardiologist and a cardiac surgeon collaborate procedurally as co-operators.

Despite these detailed preprocedural assessments by the heart team, recent studies have suggested that the predominant evidence-based scoring systems, such as the Society of Thoracic Surgeons (STS) score, the EuroSCORE, and transcatheter valve therapy (TVT) score, have limitations in predicting outcomes after TAVR.[3,4] This is likely, at least in part, due to the fact that these scoring systems were developed using populations of patients that may no longer be fully reflective of the contemporary patients undergoing TAVR. For instance, the STS score was derived using SAVR patients, and the TVT score was developed using data from patients undergoing TAVR who were deemed inoperable or at high surgical risk. Additionally, these calculators do not incorporate aspects particularly relevant to TAVR, such as anatomic features of the diseased aortic valve.

What about other intangibles that require consideration in determining the optimal treatment strategy for patients with AS but may not fit into the STS/TVT/EuroSCORE risk algorithms? For example, an "eyeball test" has commonly been used to determine frailty for surgical intervention. Despite increasing data on quantification, these algorithms do not specifically address frailty, which is particularly important in determining prognosis in this predominantly older adult population. At times, cardiac surgeons must decide whether to perform valve replacement in patients with endocarditis related to substance use recidivism. Both illicit drug use and alcohol use are included in the STS scoring algorithm. Assessment of likely compliance with antiplatelet therapy is frequently a consideration for interventional cardiologists when deciding on the appropriateness of percutaneous coronary intervention in high-risk anatomical scenarios. Similarly, assessment of likely compliance may be a consideration for operators when considering whether to perform TAVR.

Abugrin et al[5] now report on the utilization of SAVR and TAVR among patients hospitalized with AS, focusing on differences in the use of these procedures in patients with mental health disorders. The authors report that mental health disorders are associated with a lower rate of TAVR in this population, and they demonstrate a correlation between an increasing number of mental health disorders with progressively lower application of TAVR. This observation is consistent with previous studies demonstrating that patients with mental health disorders hospitalized with myocardial infarction are substantially less likely to undergo coronary revascularization procedures than those without mental disorders.[6] The reasons for the lower utilization of cardiovascular procedures in these patients remain unclear. Do these decisions reflect systemic bias toward patients with mental health disorders? Are they driven by patient factors such as poor health literacy and distrust of the health care system? Do broader social barriers to health care for those with mental health disorders play a role? Or do these findings reflect nuanced clinical judgment? It is likely that all these contribute to some degree.

The findings of the current study could be interpreted to suggest an inherent bias toward patients with mental health disorders; however,

any such inference is limited by potential confounding factors and the lack of critical patient-specific clinical data, such as detailed echocardiographic findings for the populations with and without mental health disorders. A closer look at the available data also reveals that there were significant differences between the 2 groups of patients. First, the population of patients with mental health disorders had a higher percentage of women. Prior studies have demonstrated a lower application of aortic valve replacement among women.[7] Although outcomes after TAVR appear largely similar for women as compared with men,[8] the assessment of women with AS is more frequently confounded by low-gradient severe AS,[9] and this may lead to further longitudinal assessment rather than early intervention during the index hospitalization. Prior studies have shown gaps in care, particularly in the population of patients with low-gradient AS, where approximately two-thirds are not treated with AVR.[10]

Additionally, age factors into the current analysis. Patients with mental health disorders were younger than patients without reported mental health diagnoses. Although the authors adjusted for age in their analyses, younger patients may have been more frequently directed to SAVR as an approved treatment with known longevity. During the study period of 2017-2019, low-risk TAVR was not yet FDA-approved, and thus younger patients, who are more likely to be low risk, may have not had an option for treatment with TAVR. Moreover, younger patients may have had a higher incidence of bicuspid aortic valve, which would have precluded these patients from TAVR in most centers and would have been an exclusion for participation in many clinical trials of TAVR. In the current study a bicuspid valve was identified in 0.8% vs 0.6% of patients with and without mental health disorders ($P < .001$); however, without detailed echocardiographic data, a more substantial difference cannot be excluded.

The presence of mental health disorders may also directly influence the decision of clinicians on whether to perform TAVR for AS. Symptoms are an important component in the decision to pursue TAVR, and mental health disorders could contribute to challenges in determining the nature of the patient's symptoms. Additionally, certain mental health disorders may influence the operators' anticipation of compliance with pharmacologic therapy and follow-up imaging after TAVR. It might be anticipated that informed consent for TAVR would be more complex in the setting of mental health disorders. Physicians may struggle to communicate nuanced information to these patients, and the patients themselves may have a greater distrust of the medical system due to prior unfavorable health care interactions or due to the nature of their mental health disorder itself. These considerations could create barriers to communication, true informed consent, and shared decision-making. TAVR also remains a field of very active clinical research. Compliance and commitment to follow-up are important to the integrity of these trials, and the presence of mental health disorders might limit the enrollment of these patients.

When considering TAVR for those with mental health disorders, operators must also consider the available data suggesting less favorable clinical outcomes in this population. The presence of psychosocial risk factors, including psychiatric disease, has been associated with worse outcomes after TAVR and SAVR.[11] A recent study has shown that patients with depression who undergo TAVR are at risk of poorer postprocedural outcomes.[12] This association with worse outcomes can influence clinical decision-making.

Multiple observational studies have now reported reduced application of cardiac interventions in patients with mental health disorders. Is it enough to continue to restate these findings? Should we expect that observations will be different when other technologies, such as transcatheter mitral valve replacement, transcatheter edge-to-edge repair, or transcatheter tricuspid valve replacement are analyzed? Recent statistics suggest that 1 in 20 adults in the United States lives with at least 1 serious mental health disorder.[13] In a prospective TAVR study, symptoms of depression were identified in nearly 20% of patients.[12] Just as preprocedural assessment tools, clinical databases, and research study data collection tools have been honed over time to assess the impact of race, sex, socioeconomic status, and substance use disorders; perhaps the findings from Abugrin et al[5] should motivate cardiologists and cardiac surgeons to address mental health disorders systematically in clinical assessment algorithms. Identification of a serious mental health disorder might trigger a formal assessment of the patient by a mental health professional. Better insight into the disease could foster greater empathy among proceduralists, and a comprehensive plan for management and clinical follow-up of mental health issues may help reassure operators that TAVR is feasible in affected patients. Additional work may also reveal gaps in care where systems-based interventions could help improve treatment rates in this unique population of patients. By studying these issues prospectively, incorporating mental health professionals in the heart team, and applying a systematic approach to care, perhaps the barriers to optimal health care for patients with mental health disorders can be lowered. With great power comes great responsibility, and perhaps it is the time to act.

Declaration of competing interest

Funding sources

References

1. Iung B, Cachier A, Baron G, et al. Decision-making in elderly patients with severe aortic stenosis: why are so many denied surgery? *Eur Heart J*. 2005;26(24):2714–2720. https://doi.org/10.1093/eurheartj/ehi471
2. Mori M, Gupta A, Wang Y, et al. Trends in transcatheter and surgical aortic valve replacement among older adults in the United States. *J Am Coll Cardiol*. 2021;78(22):2161–2172. https://doi.org/10.1016/j.jacc.2021.09.855
3. Al-Azizi K, Shih E, DiMaio JM, et al. Assessment of TVT and STS Risk Score performances in patients undergoing transcatheter aortic valve replacement. *J Soc Cardiovasc Angiogr Interv*. 2023;2(3). https://doi.org/10.1016/j.jscai.2023.100600
4. Tarantini G, Lefèvre T, Terkelsen CJ, et al. One-year outcomes of a European transcatheter aortic valve implantation cohort according to surgical risk. *Circ Cardiovasc Interv*. 2019;12(1):e006724. https://doi.org/10.1161/CIRCINTERVENTIONS.118.006724
5. Abugrin M, Zagorulko A, Aboulqassim B, Raja A, Thyagaturu H, Sinyagovsky P. Differences in TAVR utilization in aortic stenosis among patients with and without psychiatric comorbidities. *J Soc Cardiovasc Angiogr Interv*. 2024;3:102235.
6. Druss BG, Bradford DW, Rosenheck RA, Radford MJ, Krumholz HM. Mental disorders and use of cardiovascular procedures after myocardial infarction. *JAMA*. 2000;283(4):506–511. https://doi.org/10.1001/jama.283.4.506
7. Lowenstern A, Sheridan P, Wang TY, et al. Sex disparities in patients with symptomatic severe aortic stenosis. *Am Heart J*. 2021;237:116–126. https://doi.org/10.1016/j.ahj.2021.01.021
8. Chandrasekhar J, Dangas G, Yu J, et al. Sex-based differences in outcomes with transcatheter aortic valve therapy: TVT registry from 2011 to 2014. *J Am Coll Cardiol*. 2016;68(25):2733–2744. https://doi.org/10.1016/j.jacc.2016.10.041
9. Naoum C, Blanke P, Dvir D, et al. Clinical outcomes and imaging findings in women undergoing TAVR. *JACC Cardiovasc Imaging*. 2016;9(4):483–493. https://doi.org/10.1016/j.jcmg.2016.02.009
10. Li SX, Patel NK, Flannery LD, et al. Trends in utilization of aortic valve replacement for severe aortic stenosis. *J Am Coll Cardiol*. 2022;79(9):864–877. https://doi.org/10.1016/j.jacc.2021.11.060
11. Newell P, Zogg C, Shirley H, et al. The effect of psychosocial risk factors on outcomes after aortic valve replacement. *JACC Cardiovasc Interv*. 2022;15(22):2326–2335. https://doi.org/10.1016/j.jcin.2022.08.014
12. El-Sabawi B, Cloud H, Patel JN, et al. Association of depression and cognitive dysfunction with patient-centered outcomes after transcatheter aortic valve replacement. *Circ Cardiovasc Interv*. 2023;16(8):e012875. https://doi.org/10.1161/CIRCINTERVENTIONS.123.012875
13. National Institute of Mental Health. Mental illness. Accessed August 16, 2024. https://www.nimh.nih.gov/health/statistics/mental-illness#part_2541