Risk Re-Classification with Updated Society of Thoracic Surgeons Score in 660 Patients Undergoing Transcatheter Aortic Valve Replacement: The Result of the K-TAVI Registry

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In many countries, the Society of Thoracic Surgeons (STS) score is the cornerstone of risk assessment for patients with symptomatic severe aortic stenosis undergoing transcatheter aortic valve replacement or implantation [TAVR(I)]. Original scores were derived from patient data between 2002 and 2006. The score has had a recent major update based on STS data from 2011 to 2016 to incorporate evolving changes in patient characteristics and surgical practice [1,2]. Since 2007, high-risk patients have increasingly undergone TAVR, and advances in surgical techniques, anesthesia, and critical care have led to improved surgical outcomes. The STS risk calculator currently in use is calculated with the 2018 risk model based on the Adult Cardiac Surgery Database (ACSD) version 2.9. We aimed to evaluate the effect of the updated score on documented STS scores from patients in the Korean-TAVI [K-TAVI] [3].

We examined a cohort of 660 patients who had severe aortic stenosis and underwent TAVR between June 2015 and June 2018. Patient eligibility for a TAVR procedure was determined by a multidisciplinary team comprising interventional cardiologists, imaging cardiologists, cardiothoracic surgeons, radiologists, and anesthesiologists. The local heart team of each institution evaluated each patient's preoperative data and selected those for whom TAVR was deemed the best treatment option. Updated STS scores were calculated in March 2020 using the updated STS ACSD version 2.9 and included data from the time of trial enrollment.

The means of the predicted mortality from the previous and updated STS score calculators were 7.56 ± 6.68% and 4.50 ± 3.53% (p < 0.001), respectively. The mean difference between the previous and updated STS scores was -3.07% (95% confidence interval [CI]: -3.51 -2.62). Among the study participants, 315 (47.8%) patients were reclassified as having a lower risk (103 [15.6%]; high to intermediate risk, 137 [20.8%]; high to low risk, 75 [11.4%]; intermediate to low risk), and 41 (6.3%) patients were reclassified as having a higher risk (32 [4.9%]; low to intermediate risk, 9 [1.4%]; intermediate to high risk) based on the updated STS scores. This decrease in STS score was more pronounced in patients in whom the previous STS scores were very high.

The updated STS score offers a contemporary assessment of risk for patients undergoing cardiac surgery and has been validated with up-to-date patient outcomes. The current study showed a statistically significant reduction in the updated STS scores and clinically significant changes in patient risk categorization when the updated scores were compared to previous versions in a national cohort of 660 patients assessed for TAVR. Our results indicate that the use of the updated STS score results in a lower risk estimation of cardiac intervention and may move patients from a higher risk group to a lower risk group. The reasons for this reduction are complex and multifactorial, with improved surgical techniques and post-operative care likely being the most important factors. It could also be hypothesized that increasing numbers of complex patients being treated with TAVR, rather than surgical aortic valve replacement (SAVR), for severe aortic stenosis might have resulted in a reduction in adverse surgical outcomes, thus contributing to lower STS score prediction. Nonetheless, the STS score remains the starting point for risk determination for all patients undergoing TAVR in many countries, including Korea. The results of our study showed that it might not be appropriate to perform risk assessment in TAVR patients based on the STS score alone.
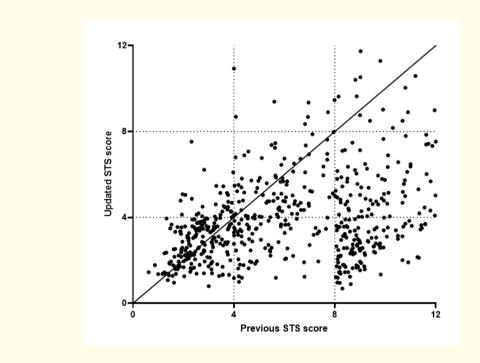
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As the use of TAVR procedures gradually expands, the number of patients undergoing SAVR is expected to gradually decrease. Therefore, it would not be appropriate to use a risk score based on historic outcomes for patients undergoing TAVR. Recognizing the limitations of scores based on SAVR, a number of alternative scores have been proposed [4,5], although they have yet to be widely adopted in clinical practice. Rather than evaluating patients with STS risk score, a better approach might be to allow the heart team to determine the optimal treatment strategy for an individual patient regardless of the risk score.

In summary, when calculating STS scores for patients being assessed for TAVR, changes to the STS score algorithm over time can result in a significant reduction in scores. This has important implications for the interpretation of clinical trials and indications for device use because there may be considerable differences in risk-defined patient populations.

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