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**Title:** Readmission after Transcatheter Aortic Valve Replacement in the Modern Era: A Quality Improvement Study

**Background:**

Transcatheter Aortic Valve Replacement (TAVR) is the current standard of care for severe symptomatic aortic stenosis (AS) in patients deemed to be high risk for surgical aortic valve replacement (SAVR). As the field moves towards the use of TAVR among lower risk patient groups, a need to address the high readmission burden associated with TAVR has emerged. 30-day post TAVR readmission rates have been found to be around 18%, and 1-year post TAVR readmission rates have been reported to be as high as 44%. The purpose of our study was to identify common predictors of post-TAVR re-hospitalization and to recommend corresponding interventions to reduce readmission rates.

**Methods:**

We conducted a narrative review of the literature on TAVR readmissions using PubMed. By searching keywords including, “TAVR readmission”, “TAVI”, “re-hospitalization” and “TAVR outcomes,” we identified published articles from 2002 to 2020 that evaluated outcomes after TAVR, with a specific focus on early (defined as 30 days or less) readmission and late (defined as 30 days to one-year post-TAVR) readmission. We included randomized controlled trials as well as observational studies, reviews, commentaries, and editorials. In selected articles, we noted major causes for TAVR readmission as well as predictors of readmission, median time to readmission, comparisons of outcomes with surgical aortic valve replacement and medical therapy, and any additional adverse outcomes associated with predictors of readmission, such as mortality. Predictors of readmission were categorized as baseline patient characteristics, procedural based, or pre-and-post-TAVR management based.

**Results:**

A total of 54 studies of 514,353 patients, including patients with symptomatic aortic stenosis treated with either TAVR or SAVR, patients with atrial fibrillation, and patients with chronic lung disease, were included in our review. The majority of readmissions post-TAVR are due to non-cardiac reasons (58%) when compared to cardiac causes (42%). Among non-cardiac readmissions, respiratory complications are the leading reason for readmission followed by infection and bleeding. Among cardiac causes for readmission, the leading reason is heart failure followed by arrhythmias. Respiratory readmissions are largely predicted by patient baseline chronic lung disease. The most common infections are urinary tract infections followed by pneumonia and then access-site infections. Predictors of infection-related readmissions were largely procedural-based with the use invasive interventions, such as mechanical ventilation and urinary indwelling catheters, as well as general anesthesia being found to predict readmission. Bleeding readmissions, largely either GI or access-site related, were found to be largely predicted by post-TAVR medical regimens, with discharge on aspirin and clopidogrel combined being associated with higher bleeding incidence and readmission when compared to aspirin monotherapy. Predictors of heart failure readmission include a number of markers of declining heart functioning, such as NT-proBNP changes pre-and-post TAVR. Additionally, medical therapy post-TAVR has also been reported to provide insight into readmission likelihood. While discontinuation of diuretics has been associated with increased readmission rates, it has recently been found that discharging patients on RAAS inhibitors is associated with reduced heart failure readmission. Arrhythmia-related readmissions are largely due to tachycardias as opposed to bradycardia episodes. These readmissions are also associated with medical management decisions, with discharge on an anticoagulant for patients with baseline atrial fibrillation being associated with reduced readmission, and newer direct oral anticoagulants (DOAC) yielding better outcomes than warfarin. In terms of time to readmission, early readmissions were often due to infection, heart failure, and bleeding while late readmissions were more commonly due to arrhythmia and respiratory complications.

**Conclusion:**

Overall, most readmissions are non-cardiac in etiology. The leading causes of non-cardiac readmission are respiratory complications, infections, and bleeding, while the leading causes of cardiac readmission are heart failure and arrhythmias. While respiratory complications are largely predicted by patient baseline characteristics and infections by procedural factors, bleeding, heart failure, and arrhythmias have all been strongly linked to components of the post-TAVR medical management and, therefore, can potentially be prevented. Readmission rates can be reduced through interventions and further research optimizing the heart failure, bleeding, and arrhythmia pharmacotherapy post-TAVR as well as additional follow-up for high-risk patients.

**Freeform Abstract:**