MASSACHUSETTS

Blue Cross Blue Shield of Massachusetts is an Independent Licensee of the Blue Cross and Blue Shield Association

Medical Policy
Transcatheter Aortic Valve Implantation for Aortic Stenosis

Table of Contents

Policy Number: 392

BCBSA Reference Number: 7.01.132 (For Plan internal use only)

Related Policies

Transcatheter Pulmonary Valve Implantation, #403

Policy

Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity

Transcatheter aortic valve replacement with a U.S. Food and Drug Administration (FDA)–approved transcatheter heart valve system, performed via an approach consistent with the device's FDA-approved labeling, may be considered **MEDICALLY NECESSARY** for individuals with native valve aortic stenosis when **all** of the following conditions are present:

- Severe aortic stenosis with a calcified aortic annulus; **AND**
- New York Heart Association heart failure class II, III, or IV symptoms; **AND**
- Left ventricular ejection fraction greater than 20%; **AND**
- Individual does not have unicuspid or bicuspid aortic valves.

Transcatheter aortic valve replacement with a transcatheter heart valve system approved for use for repair of a degenerated bioprosthetic valve (valve-in-valve) may be considered **MEDICALLY NECESSARY** when all of the following conditions are present:

- Failed (stenosed, insufficient, or combined) of a surgical bioprosthetic aortic valve; **AND**
- NYHA heart failure class II, III or IV symptoms; **AND**
- Left ventricular ejection fraction greater than 20%; **AND**
- Individual is not an operable candidate for open surgery, as judged by at least 2 cardiovascular specialists (cardiologist and/or cardiac surgeon); or individual is an operable candidate but is at high risk* for open surgery.

*The FDA definition of **high risk** for open surgery is:

- Society of Thoracic Surgeons predicted operative risk score of 8% or higher; **or**
- Judged by a heart team, which includes an experienced cardiac surgeon and a cardiologist, to have an expected mortality risk of 15% or higher for open surgery.

*The FDA definition of **extreme risk** or inoperable for open surgery is:
- Predicted risk of operative mortality and/or serious irreversible morbidity 50% or higher for open surgery.

*The FDA definition of **intermediate risk** is:
- Society of Thoracic Surgeons predicted operative risk score of 3% to 7%.

Individuals with Society of Thoracic Surgeons predicted operative risk score of less than 3% or 4% are considered at low risk for open surgery.

*For the use of the Sapien or CoreValve devices, severe aortic stenosis is defined by the presence of **one or more** of the following criteria:
- An aortic valve area of less than or equal to 1 cm^2
- An aortic valve area index of less than or equal to 0.6 cm^2/m^2
- A mean aortic valve gradient greater than or equal to 40 mm Hg
- A peak aortic-jet velocity greater than or equal to 4.0 m/s.

Transcatheter aortic valve replacement is considered **INVESTIGATIONAL** for all other indications.

Use of a cerebral embolic protection device (e.g., Sentinel) during transcatheter aortic valve replacement procedures is considered **INVESTIGATIONAL**.

Prior Authorization Information

Inpatient
- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

Outpatient
- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	This procedure is performed in the inpatient setting.
Commercial PPO and Indemnity	This procedure is performed in the inpatient setting.

CPT Codes / HCPCS Codes / ICD Codes

Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.

Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.
The following codes are included below for informational purposes only; this is not an all-inclusive list.

The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity:

CPT Codes

CPT codes:	Code Description
33361	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; percutaneous femoral artery approach

33362	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; open femoral artery approach
33363	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; open axillary artery approach
33364	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; open iliac artery approach
33365	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; transaortic approach (eg, median sternotomy, mediastinotomy)
33366	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; transapical exposure (eg, left thoracotomy)
33367	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; cardiopulmonary bypass support with percutaneous peripheral arterial and venous cannulation (eg, femoral vessels) (List separately in addition to code for primary procedure)
33368	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; cardiopulmonary bypass support with open peripheral arterial and venous cannulation (eg, femoral, iliac, axillary vessels) (List separately in addition to code for primary procedure)
33369	Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; cardiopulmonary bypass support with central arterial and venous cannulation (eg, aorta, right atrium, pulmonary artery) (List separately in addition to code for primary procedure)

ICD-10 Procedure Codes

ICD-10-PCS procedure codes:	**Code Description**
02RF0JZ	Replacement of Aortic Valve with Synthetic Substitute, Open Approach
02RF3JZ	Replacement of Aortic Valve with Synthetic Substitute, Percutaneous Approach
02RF4JZ	Replacement of Aortic Valve with Synthetic Substitute, Percutaneous Endoscopic Approach

The following CPT code is considered investigational for <u>Commercial Members: Managed Care (HMO and POS), PPO, Indemnity, Medicare HMO Blue and Medicare PPO Blue:</u>

CPT Codes

CPT codes:	**Code Description**
33370	Transcatheter placement and subsequent removal of cerebral embolic protection device(s), including arterial access, catheterization, imaging, and radiological supervision and interpretation, percutaneous (List separately in addition to code for primary procedure)

Description

Aortic Stenosis

Aortic stenosis is defined as narrowing of the aortic valve opening, resulting in obstruction of blood flow from the left ventricle into the ascending aorta. Progressive calcification of the aortic valve is the most common etiology in North America and Europe, while rheumatic fever is the most common etiology in developing countries.[1.] Congenital abnormalities of the aortic valve, most commonly a bicuspid or unicuspid valve, increase the risk of aortic stenosis, but aortic stenosis can also occur in a normal aortic valve. Risk factors for calcification of a congenitally normal valve mirror those for atherosclerotic vascular disease, including advanced age, male gender, smoking, hypertension, and hyperlipidemia.[1.] Thus, the

pathogenesis of calcific aortic stenosis is thought to be similar to that of atherosclerosis (ie, deposition of atherogenic lipids and infiltration of inflammatory cells, followed by progressive calcification).

The natural history of aortic stenosis involves a long asymptomatic period, with slowly progressive narrowing of the valve until the stenosis reaches the severe stage. At this time, symptoms of dyspnea, chest pain, and/or dizziness/syncope often occur, and the disorder progresses rapidly. Treatment of aortic stenosis is replacement of the diseased valve with a bioprosthetic or mechanical valve.

Disease Burden

Aortic stenosis is a relatively common disorder in elderly patients and is the most common acquired valve disorder in the United States. Approximately 2% to 4% of people older than 65 years of age have evidence of significant aortic stenosis,[1] increasing up to 8% of people by age 85 years.[2] In the Helsinki Aging Study (1993), a population-based study of 501 patients aged 75 to 86 years, the prevalence of severe aortic stenosis by echocardiography was estimated to be 2.9%.[3] In the United States, more than 50,000 aortic valve replacements are performed annually due to severe aortic stenosis.

Aortic stenosis does not cause substantial morbidity or mortality when the disease is mild or moderate in severity. By the time it becomes severe, there is an untreated mortality rate of approximately 50% within 2 years.[4] Open surgical repair is an effective treatment for reversing aortic stenosis, and artificial valves have demonstrated good durability for up to 20 years.[4] However, these benefits are accompanied by perioperative mortality of approximately 3% to 4% and substantial morbidity,[4] both of which increase with advancing age.

Unmet Needs

Many patients with severe, symptomatic aortic stenosis are poor operative candidates. Approximately 30% of patients presenting with severe aortic stenosis do not undergo open surgery due to factors such as advanced age, advanced left ventricular dysfunction, or multiple medical comorbidities.[5] For patients who are not surgical candidates, medical therapy can partially alleviate the symptoms of aortic stenosis but does not affect the underlying disease progression. Percutaneous balloon valvuloplasty can be performed, but this procedure has less than optimal outcomes.[6] Balloon valvuloplasty can improve symptoms and increase flow across the stenotic valve but is associated with high rates of complications such as stroke, myocardial infarction, and aortic regurgitation. Also, restenosis can occur rapidly, and there is no improvement in mortality. As a result, there is a large unmet need for less invasive treatments for aortic stenosis in patients at increased risk for open surgery.

Treatment

Transcatheter aortic valve implantation, also known as transcatheter aortic valve replacement, has been developed in response to this unmet need and was originally intended as an alternative for patients for whom surgery was not an option due to prohibitive surgical risk or for patients at high-risk for open surgery. The procedure is performed percutaneously, most often through the transfemoral artery approach. It can also be done through the subclavian artery approach and transapically using mediastinoscopy. Balloon valvuloplasty is first performed to open up the stenotic area. This is followed by passage of a bioprosthetic artificial valve across the native aortic valve. The valve is initially compressed to allow passage across the native valve and is then expanded and secured to the underlying aortic valve annulus. The procedure is performed on the beating heart without cardiopulmonary bypass.

Summary

Description

Aortic stenosis is narrowing of the aortic valve opening, resulting in obstruction of blood flow from the left ventricle into the ascending aorta. Patients with untreated, symptomatic severe aortic stenosis have a poor prognosis. Valve replacement is an effective treatment for severe aortic stenosis. Transcatheter aortic valve implantation (TAVI), also known as transcatheter aortic valve replacement (TAVR), is being evaluated as an alternative to open surgery for patients with aortic stenosis and to nonsurgical therapy for patients with a prohibitive risk for surgery.

Summary of Evidence

For individuals who have severe symptomatic aortic stenosis who are at prohibitive risk for open surgery who receive transcatheter aortic valve implantation (TAVI), the evidence includes a randomized controlled trial (RCT) comparing TAVI with medical management in individuals at prohibitive risk of surgery, a single-arm prospective trial, multiple case series, and multiple systematic reviews. Relevant outcomes are overall survival (OS), symptoms, morbid events, and treatment-related mortality and morbidity. For patients who are not surgical candidates due to excessive surgical risk, the Placement of AoRTic TraNscathetER Valve Trial Edwards SAPIEN Transcatheter Heart Valve (PARTNER B) trial reported on results for patients treated with TAVI by the transfemoral approach compared with continued medical care with or without balloon valvuloplasty. There was a large decrease in mortality for the TAVI patients at 1 year compared with medical care. This trial also reported improvements in other relevant clinical outcomes for the TAVI group. There was an increased risk of stroke and vascular complications in the TAVI group. Despite these concerns, the overall balance of benefits and risks from this trial indicate that health outcomes are improved. For patients who are not surgical candidates, no randomized trials have compared the self-expandable valve with best medical therapy. However, results from the single-arm CoreValve Extreme Risk Pivotal Trial met trialists' prespecified objective performance goal. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have severe symptomatic aortic stenosis who are at high-risk for open surgery who receive TAVI, the evidence includes 2 RCTs comparing TAVI with surgical repair in individuals at high-risk for surgery and 1 RCT comparing 2 types of valves, multiple nonrandomized comparative studies, and systematic reviews of these studies. Relevant outcomes are OS, symptoms, morbid events, and treatment-related mortality and morbidity. For patients who are high-risk for open surgery and are surgical candidates, the PARTNER A trial reported noninferiority for survival at 1 year for the balloon-expandable valve compared with open surgery. In this trial, TAVI patients also had higher risks for stroke and vascular complications. Nonrandomized comparative studies of TAVI versus open surgery in high-risk patients have reported no major differences in rates of mortality or stroke between the 2 procedures. Since the publication of the PARTNER A trial, the CoreValve High Risk Trial demonstrated noninferiority for survival at 1 and 2 years for the self-expanding prosthesis. This trial reported no significant differences in stroke rates between groups. An RCT directly comparing the Portico valve with other United States Food and Drug Administration (FDA)-approved valves found an increase in safety outcomes with Portico at 30 days but no major differences at 2 years. Gender-specific meta-analyses have found improved mortality with TAVI compared with surgical aortic valve replacement (SAVR) in women. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have severe symptomatic aortic stenosis who are at intermediate-risk for open surgery who receive TAVI, the evidence includes 3 RCTs comparing TAVI with surgical repair including individuals at intermediate surgical risk, 2 RCTs only in patients with intermediate-risk, and multiple systematic reviews and nonrandomized cohort studies. Relevant outcomes are OS, symptoms, morbid events, and treatment-related mortality and morbidity. Five RCTs have evaluated TAVI in patients with intermediate-risk for open surgery. Three of them, which included over 4000 patients combined, reported noninferiority of TAVI versus SAVR for their composite outcome measures (generally including death and stroke). A subset analysis of patients (n=383) with low and intermediate surgical risk from a fourth trial reported higher rates of death at 2 years for TAVI versus SAVR. The final study (N=70) had an unclear hypothesis and reported 30-day mortality rates favoring SAVR (15% vs. 2%, p=.07) but used a transthoracic approach. The rates of adverse events differed between groups, with bleeding, cardiogenic shock, and acute kidney injury higher in patients randomized to open surgery and permanent pacemaker requirement higher in patients randomized to TAVI. Subgroup analyses of meta-analyses and the transthoracic arm of the Leon et al (2010) RCT have suggested that the benefit of TAVI may be limited to patients who are candidates for transfemoral access. Although several RCTs have 2 years of follow-up postprocedure, it is uncertain how many individuals require reoperation. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have severe symptomatic aortic stenosis who are at low-risk for open surgery who receive TAVI, the evidence includes RCTs comparing TAVI with surgical repair in individuals selected without specific surgical risk criteria but including patients at low surgical risk and RCTs enrolling only low surgical risk patients, systematic reviews, and nonrandomized cohort studies. Relevant outcomes are OS,

symptoms, morbid events, and treatment-related mortality and morbidity. Two RCTs (Evolut Low Risk Trial and the Study to Establish the Safety and Effectiveness of the SAPIEN 3 Transcatheter Heart Valve in Low Risk Patients Who Have Severe, Calcific, Aortic Stenosis Requiring Aortic Valve Replacement [PARTNER 3]) have been conducted exclusively in patients at low surgical risk and 1 RCT, Nordic Aortic Intervention Trial included predominantly patients at low surgical risk. In the Evolut Low Risk Trial, transcatheter aortic valve replacement was noninferior to SAVR with respect to the composite outcome of death or disabling stroke at 24 months. In the PARTNER 3 trial, the rate of the composite of death, stroke, or rehospitalization at 1 year was significantly lower with TAVI than SAVR. In the Nordic Aortic Intervention Trial, the risk of the composite outcome of death from any cause, stroke, or myocardial infarction at 5 years was similar for TAVI and SAVR and transcatheter aortic valve replacement showed less structural valve deterioration than SAVR at 6 years. In the publicly sponsored UK TAVI trial, which was conducted in patients aged 70 years or older with predominantly low surgical risk, TAVI was noninferior to SAVR with respect to all-cause mortality at 1 year. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have valve dysfunction and aortic stenosis or regurgitation after open surgical aortic valve repair who receive transcatheter aortic "valve-in-valve" (ViV) implantation, the evidence includes observational studies including registry data with follow-up ranging from 1 month to 5 years and systematic reviews. Relevant outcomes are OS, symptoms, morbid events, and treatment-related mortality and morbidity. Recent meta-analyses of observational studies have compared ViV TAVI to redo-SAVR and have reported a reduced risk of short-term mortality (<30 days) with ViV TAVI. Beyond 30 days, meta-analyses have reported mortality outcomes that were similarly favorable or improved with redo-SAVR. The PARTNER 2 registry reported a 50.6% rate of all-cause mortality after 5 years among patients with high surgical risk; patients who received a 23-mm SAPIEN XT valve had a significantly higher risk of mortality compared to those who received a 26-mm valve (hazard ratio, 1.55; 95% confidence interval, 1.09 to 2.20; p=.01). Given that no RCTs are available, selection bias cannot be ruled out. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have symptomatic aortic stenosis who receive a cerebral embolic protection device while undergoing TAVI, the evidence includes 4 RCTs of patients with low- to high-risk for open surgery. Relevant outcomes are OS, symptoms, morbid events, and treatment-related mortality and morbidity. Three RCTs have primarily focused on the number and/or volume of new brain lesions detected on magnetic resonance imaging with unclear correlations to neurocognitive outcomes. Only 1 of these trials (CLEAN-TAVI) found a significant reduction in brain lesion number; however, the relevance of this trial is limited as it used a precursor to the currently marketed Sentinel device. The largest and most recent trial (PROTECTED TAVR) enrolled 3000 patients and did not find a significant reduction in the incidence of periprocedural stroke within 72 hours or before hospital discharge. Prior trials have generally failed to demonstrate neurocognitive protection or significant reductions in major cardiac and cerebrovascular e vents. Studies have not stratified results by operative risk levels and have suggested differential benefits based on valve type. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Policy History

Date	Action
7/2023	Annual policy review. Policy revised. Investigational policy statement added for use of cerebral embolic protection devices in individuals undergoing TAVI. Minor editorial refinements to existing policy statements; intent unchanged. Clarified coding information. Effective 7/1/2023.
3/2022	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
4/2021	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
1/2021	Medicare information removed. See MP #132 Medicare Advantage Management for local coverage determination and national coverage determination reference.

6/2020	Annual policy review. Medically Necessary policy statement related to patients with native valve aortic stenosis changed to add an exclusion for patients with unicuspid or bicuspid aortic valve and to add an inclusion for patients at low risk for open surgery. Effective 6/1/2020.
4/2019	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
9/2018	Annual policy review. Policy statements revised to add patients at intermediate surgical risk to first medically necessary statement. Clarified coding information. Effective 9/1/2018.
3/2017	New references added from Annual policy review.
1/2017	Annual policy review. Medically necessary policy statement added for valve-in-valve implantation in patients at high or prohibitive risk for open surgery. Effective 1/1/2017.
3/2015	Annual policy review. Removed statement that procedures performed via the transaxillary, transiliac, transaortic, or other approaches are investigational, to reflect the approval of the CoreValve device that is labeled for use via transaxillary, transfemoral, and transaortic approaches. A statement was added to the policy statement that devices should be used according to their FDA approved indication. Effective 3/1/2015.
5/2014	Annual policy review. New medically necessary indications described. Effective 5/1/2014.
1/2014	Updated to add new CPT code 33366 and removed deleted code 0318T.
6/2013	Annual policy review. New medically necessary and investigational indications described. Effective 6/1/2013.
11/1/2012	New policy describing ongoing coverage and non-coverage.

Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:
Medical Policy Terms of Use
Managed Care Guidelines
Indemnity/PPO Guidelines
Clinical Exception Process
Medical Technology Assessment Guidelines

References

1. Freeman RV, Otto CM. Spectrum of calcific aortic valve disease: pathogenesis, disease progression, and treatment strategies. Circulation. Jun 21 2005; 111(24): 3316-26. PMID 15967862
2. Coeytaux RR, Williams JW, Gray RN, et al. Percutaneous heart valve replacement for aortic stenosis: state of the evidence. Ann Intern Med. Sep 07 2010; 153(5): 314-24. PMID 20679543
3. Lindroos M, Kupari M, Heikkilä J, et al. Prevalence of aortic valve abnormalities in the elderly: an echocardiographic study of a random population sample. J Am Coll Cardiol. Apr 1993; 21(5): 1220-5. PMID 8459080
4. Bonow RO, Carabello BA, Kanu C, et al. ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to revise the 1998 Guidelines for the Management of Patients With Valvular Heart Disease): developed in collaboration with the Society of Cardiovascular Anesthesiologists: endorsed by the Society for Cardiovascular Angiography and Interventions and the Society of Thoracic Surgeons. Circulation. Aug 01 2006; 114(5): e84-231. PMID 16880336
5. 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. Dec 2005; 26(24): 2714-20. PMID 16141261
6. Lieberman EB, Bashore TM, Hermiller JB, et al. Balloon aortic valvuloplasty in adults: failure of procedure to improve long-term survival. J Am Coll Cardiol. Nov 15 1995; 26(6): 1522-8. PMID 7594080

7. Food and Drug Administration (FDA). Boston Scientific announces LOTUS Edge aortic valve system voluntary recall and product discontinuation. January 11, 2021. https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/boston-scientific-announces-lotus-edgetm-aortic-valve-system-voluntary-recall-and-product. Accessed January 2, 2023.
8. Food and Drug Administration (FDA). De Novo Classification Request for Sentinel Cerebral Protection System. September 19, 2016; https://www.accessdata.fda.gov/cdrh_docs/reviews/DEN160043.pdf. Accessed on January 3, 2023.
9. Food and Drug Administration (FDA). 24 Hour Summary of the Circulatory System Devices Panel Meeting - Keystone Heart, Ltd TriGUARD 3 Cerebral Embolic Protection Device. August 3, 2021; https://www.fda.gov/media/151335/download. Accessed January 3, 2023.
10. Aladin AI, Case BC, Wermers JP, et al. Overview of FDA Circulatory System Devices Panel virtual meeting on TriGUARD 3 cerebral embolic protection. Catheter Cardiovasc Interv. May 2022; 99(6): 1789-1795. PMID 35084082
11. Spertus J, Peterson E, Conard MW, et al. Monitoring clinical changes in patients with heart failure: a comparison of methods. Am Heart J. Oct 2005; 150(4): 707-15. PMID 16209970
12. Figulla L, Neumann A, Figulla HR, et al. Transcatheter aortic valve implantation: evidence on safety and efficacy compared with medical therapy. A systematic review of current literature. Clin Res Cardiol. Apr 2011; 100(4): 265-76. PMID 21165626
13. Leon MB, Smith CR, Mack M, et al. Transcatheter aortic-valve implantation for aortic stenosis in patients who cannot undergo surgery. N Engl J Med. Oct 21 2010; 363(17): 1597-607. PMID 20961243
14. Reynolds MR, Magnuson EA, Lei Y, et al. Health-related quality of life after transcatheter aortic valve replacement in inoperable patients with severe aortic stenosis. Circulation. Nov 01 2011; 124(18): 1964-72. PMID 21969017
15. Makkar RR, Fontana GP, Jilaihawi H, et al. Transcatheter aortic-valve replacement for inoperable severe aortic stenosis. N Engl J Med. May 03 2012; 366(18): 1696-704. PMID 22443478
16. Svensson LG, Blackstone EH, Rajeswaran J, et al. Comprehensive analysis of mortality among patients undergoing TAVR: results of the PARTNER trial. J Am Coll Cardiol. Jul 15 2014; 64(2): 158-68. PMID 25011720
17. Kapadia SR, Tuzcu EM, Makkar RR, et al. Long-term outcomes of inoperable patients with aortic stenosis randomly assigned to transcatheter aortic valve replacement or standard therapy. Circulation. Oct 21 2014; 130(17): 1483-92. PMID 25205802
18. Webb JG, Doshi D, Mack MJ, et al. A Randomized Evaluation of the SAPIEN XT Transcatheter Heart Valve System in Patients With Aortic Stenosis Who Are Not Candidates for Surgery. JACC Cardiovasc Interv. Dec 21 2015; 8(14): 1797-806. PMID 26718510
19. Kapadia SR, Huded CP, Kodali SK, et al. Stroke After Surgical Versus Transfemoral Transcatheter Aortic Valve Replacement in the PARTNER Trial. J Am Coll Cardiol. Nov 13 2018; 72(20): 2415-2426. PMID 30442284
20. Huded CP, Arnold SV, Chhatriwalla AK, et al. Rehospitalization Events After Aortic Valve Replacement: Insights From the PARTNER Trial. Circ Cardiovasc Interv. Dec 2022; 15(12): e012195. PMID 36538580
21. Popma JJ, Adams DH, Reardon MJ, et al. Transcatheter aortic valve replacement using a self-expanding bioprosthesis in patients with severe aortic stenosis at extreme risk for surgery. J Am Coll Cardiol. May 20 2014; 63(19): 1972-81. PMID 24657695
22. Reardon MJ, Adams DH, Coselli JS, et al. Self-expanding transcatheter aortic valve replacement using alternative access sites in symptomatic patients with severe aortic stenosis deemed extreme risk of surgery. J Thorac Cardiovasc Surg. Dec 2014; 148(6): 2869-76.e1-7. PMID 25152474
23. Mack MJ, Brennan JM, Brindis R, et al. Outcomes following transcatheter aortic valve replacement in the United States. JAMA. Nov 20 2013; 310(19): 2069-77. PMID 24240934
24. Yakubov SJ, Adams DH, Watson DR, et al. 2-Year Outcomes After Iliofemoral Self-Expanding Transcatheter Aortic Valve Replacement in Patients With Severe Aortic Stenosis Deemed Extreme Risk for Surgery. J Am Coll Cardiol. Sep 22 2015; 66(12): 1327-34. PMID 26383718
25. Baron SJ, Arnold SV, Reynolds MR, et al. Durability of quality of life benefits of transcatheter aortic valve replacement: Long-term results from the CoreValve US extreme risk trial. Am Heart J. Dec 2017; 194: 39-48. PMID 29223434

26. Arnold SV, Petrossian G, Reardon MJ, et al. Five-Year Clinical and Quality of Life Outcomes From the CoreValve US Pivotal Extreme Risk Trial. Circ Cardiovasc Interv. Jun 2021; 14(6): e010258. PMID 34092091
27. Osnabrugge RL, Arnold SV, Reynolds MR, et al. Health status after transcatheter aortic valve replacement in patients at extreme surgical risk: results from the CoreValve U.S. trial. JACC Cardiovasc Interv. Feb 2015; 8(2): 315-323. PMID 25700755
28. Linke A, Wenaweser P, Gerckens U, et al. Treatment of aortic stenosis with a self-expanding transcatheter valve: the International Multi-centre ADVANCE Study. Eur Heart J. Oct 07 2014; 35(38): 2672-84. PMID 24682842
29. Piazza N, Grube E, Gerckens U, et al. Procedural and 30-day outcomes following transcatheter aortic valve implantation using the third generation (18 Fr) corevalve revalving system: results from the multicentre, expanded evaluation registry 1-year following CE mark approval. EuroIntervention. Aug 2008; 4(2): 242-9. PMID 19110790
30. Rodés-Cabau J, Webb JG, Cheung A, et al. Transcatheter aortic valve implantation for the treatment of severe symptomatic aortic stenosis in patients at very high or prohibitive surgical risk: acute and late outcomes of the multicenter Canadian experience. J Am Coll Cardiol. Mar 16 2010; 55(11): 1080-90. PMID 20096533
31. Zahn R, Gerckens U, Grube E, et al. Transcatheter aortic valve implantation: first results from a multi-centre real-world registry. Eur Heart J. Jan 2011; 32(2): 198-204. PMID 20864486
32. Tamburino C, Capodanno D, Ramondo A, et al. Incidence and predictors of early and late mortality after transcatheter aortic valve implantation in 663 patients with severe aortic stenosis. Circulation. Jan 25 2011; 123(3): 299-308. PMID 21220731
33. Panoulas VF, Francis DP, Ruparelia N, et al. Female-specific survival advantage from transcatheter aortic valve implantation over surgical aortic valve replacement: Meta-analysis of the gender subgroups of randomised controlled trials including 3758 patients. Int J Cardiol. Jan 01 2018; 250: 66-72. PMID 29169764
34. Dagan M, Yeung T, Stehli J, et al. Transcatheter Versus Surgical Aortic Valve Replacement: An Updated Systematic Review and Meta-Analysis with a Focus on Outcomes by Sex. Heart Lung Circ. Jan 2021; 30(1): 86-99. PMID 32732125
35. Villablanca PA, Mathew V, Thourani VH, et al. A meta-analysis and meta-regression of long-term outcomes of transcatheter versus surgical aortic valve replacement for severe aortic stenosis. Int J Cardiol. Dec 15 2016; 225: 234-243. PMID 27732927
36. Mack MJ, Leon MB, Smith CR, et al. 5-year outcomes of transcatheter aortic valve replacement or surgical aortic valve replacement for high surgical risk patients with aortic stenosis (PARTNER 1): a randomised controlled trial. Lancet. Jun 20 2015; 385(9986): 2477-84. PMID 25788234
37. Reardon MJ, Adams DH, Kleiman NS, et al. 2-Year Outcomes in Patients Undergoing Surgical or Self-Expanding Transcatheter Aortic Valve Replacement. J Am Coll Cardiol. Jul 14 2015; 66(2): 113-21. PMID 26055947
38. Panchal HB, Ladia V, Desai S, et al. A meta-analysis of mortality and major adverse cardiovascular and cerebrovascular events following transcatheter aortic valve implantation versus surgical aortic valve replacement for severe aortic stenosis. Am J Cardiol. Sep 15 2013; 112(6): 850-60. PMID 23756547
39. Takagi H, Niwa M, Mizuno Y, et al. A meta-analysis of transcatheter aortic valve implantation versus surgical aortic valve replacement. Ann Thorac Surg. Aug 2013; 96(2): 513-9. PMID 23816417
40. Smith CR, Leon MB, Mack MJ, et al. Transcatheter versus surgical aortic-valve replacement in high-risk patients. N Engl J Med. Jun 09 2011; 364(23): 2187-98. PMID 21639811
41. Reynolds MR, Magnuson EA, Wang K, et al. Health-related quality of life after transcatheter or surgical aortic valve replacement in high-risk patients with severe aortic stenosis: results from the PARTNER (Placement of AoRTic TraNscathetER Valve) Trial (Cohort A). J Am Coll Cardiol. Aug 07 2012; 60(6): 548-58. PMID 22818074
42. Généreux P, Cohen DJ, Williams MR, et al. Bleeding complications after surgical aortic valve replacement compared with transcatheter aortic valve replacement: insights from the PARTNER I Trial (Placement of Aortic Transcatheter Valve). J Am Coll Cardiol. Mar 25 2014; 63(11): 1100-9. PMID 24291283
43. Adams DH, Popma JJ, Reardon MJ, et al. Transcatheter aortic-valve replacement with a self-expanding prosthesis. N Engl J Med. May 08 2014; 370(19): 1790-8. PMID 24678937

44. Deeb GM, Reardon MJ, Chetcuti S, et al. 3-Year Outcomes in High-Risk Patients Who Underwent Surgical or Transcatheter Aortic Valve Replacement. J Am Coll Cardiol. Jun 07 2016; 67(22): 2565-74. PMID 27050187
45. Zorn GL, Little SH, Tadros P, et al. Prosthesis-patient mismatch in high-risk patients with severe aortic stenosis: A randomized trial of a self-expanding prosthesis. J Thorac Cardiovasc Surg. Apr 2016; 151(4): 1014-22, 1023.e1-3. PMID 26614412
46. Arnold SV, Chinnakondepalli KM, Magnuson EA, et al. Five-Year Health Status After Self-expanding Transcatheter or Surgical Aortic Valve Replacement in High-risk Patients with Severe Aortic Stenosis. JAMA Cardiol. Jan 01 2021; 6(1): 97-101. PMID 32997095
47. Conte JV, Hermiller J, Resar JR, et al. Complications After Self-expanding Transcatheter or Surgical Aortic Valve Replacement. Semin Thorac Cardiovasc Surg. Autumn 2017; 29(3): 321-330. PMID 29195573
48. Gleason TG, Reardon MJ, Popma JJ, et al. 5-Year Outcomes of Self-Expanding Transcatheter Versus Surgical Aortic Valve Replacement in High-Risk Patients. J Am Coll Cardiol. Dec 04 2018; 72(22): 2687-2696. PMID 30249462
49. Makkar RR, Cheng W, Waksman R, et al. Self-expanding intra-annular versus commercially available transcatheter heart valves in high and extreme risk patients with severe aortic stenosis (PORTICO IDE): a randomised, controlled, non-inferiority trial. Lancet. Sep 05 2020; 396(10252): 669-683. PMID 32593323
50. Muneretto C, Bisleri G, Moggi A, et al. Treating the patients in the 'grey-zone' with aortic valve disease: a comparison among conventional surgery, sutureless valves and transcatheter aortic valve replacement. Interact Cardiovasc Thorac Surg. Jan 2015; 20(1): 90-5. PMID 25320140
51. Minutello RM, Wong SC, Swaminathan RV, et al. Costs and in-hospital outcomes of transcatheter aortic valve implantation versus surgical aortic valve replacement in commercial cases using a propensity score matched model. Am J Cardiol. May 15 2015; 115(10): 1443-7. PMID 25784513
52. Sedaghat A, Al-Rashid F, Sinning JM, et al. Outcome in TAVI patients with symptomatic aortic stenosis not fulfilling PARTNER study inclusion criteria. Catheter Cardiovasc Interv. Nov 15 2015; 86(6): 1097-104. PMID 26032437
53. Arora S, Strassle PD, Ramm CJ, et al. Transcatheter Versus Surgical Aortic Valve Replacement in Patients with Lower Surgical Risk Scores: A Systematic Review and Meta-Analysis of Early Outcomes. Heart Lung Circ. Aug 2017; 26(8): 840-845. PMID 28169084
54. Arora S, Vaidya SR, Strassle PD, et al. Meta-analysis of transfemoral TAVR versus surgical aortic valve replacement. Catheter Cardiovasc Interv. Mar 01 2018; 91(4): 806-812. PMID 29068166
55. Garg A, Rao SV, Visveswaran G, et al. Transcatheter Aortic Valve Replacement Versus Surgical Valve Replacement in Low-Intermediate Surgical Risk Patients: A Systematic Review and Meta-Analysis. J Invasive Cardiol. Jun 2017; 29(6): 209-216. PMID 28570236
56. Singh K, Carson K, Rashid MK, et al. Transcatheter Aortic Valve Implantation in Intermediate Surgical Risk Patients with Severe Aortic Stenosis: A Systematic Review and Meta-Analysis. Heart Lung Circ. Feb 2018; 27(2): 227-234. PMID 28473216
57. Ando T, Takagi H, Grines CL. Transfemoral, transapical and transcatheter aortic valve implantation and surgical aortic valve replacement: a meta-analysis of direct and adjusted indirect comparisons of early and mid-term deaths. Interact Cardiovasc Thorac Surg. Sep 01 2017; 25(3): 484-492. PMID 28549125
58. Gozdek M, Raffa GM, Suwalski P, et al. Comparative performance of transcatheter aortic valve-in-valve implantation versus conventional surgical redo aortic valve replacement in patients with degenerated aortic valve bioprostheses: systematic review and meta-analysis. Eur J Cardiothorac Surg. Mar 01 2018; 53(3): 495-504. PMID 29029105
59. Khan SU, Lone AN, Saleem MA, et al. Transcatheter vs surgical aortic-valve replacement in low- to intermediate-surgical-risk candidates: A meta-analysis and systematic review. Clin Cardiol. Nov 2017; 40(11): 974-981. PMID 29168984
60. Tam DY, Vo TX, Wijeysundera HC, et al. Transcatheter vs Surgical Aortic Valve Replacement for Aortic Stenosis in Low-Intermediate Risk Patients: A Meta-analysis. Can J Cardiol. Sep 2017; 33(9): 1171-1179. PMID 28843328
61. Witberg G, Lador A, Yahav D, et al. Transcatheter versus surgical aortic valve replacement in patients at low surgical risk: A meta-analysis of randomized trials and propensity score matched observational studies. Catheter Cardiovasc Interv. Aug 01 2018; 92(2): 408-416. PMID 29388308

62. Ueshima D, Fovino LN, D'Amico G, et al. Transcatheter versus surgical aortic valve replacement in low- and intermediate-risk patients: an updated systematic review and meta-analysis. Cardiovasc Interv Ther. Jul 2019; 34(3): 216-225. PMID 30232711
63. Levett JY, Windle SB, Filion KB, et al. Meta-Analysis of Transcatheter Versus Surgical Aortic Valve Replacement in Low Surgical Risk Patients. Am J Cardiol. Apr 15 2020; 125(8): 1230-1238. PMID 32089249
64. Vipparthy SC, Ravi V, Avula S, et al. Meta-Analysis of Transcatheter Aortic Valve Implantation Versus Surgical Aortic Valve Replacement in Patients with Low Surgical Risk. Am J Cardiol. Feb 01 2020; 125(3): 459-468. PMID 31784051
65. Anantha-Narayanan M, Kandasamy VV, Reddy YN, et al. Low-Risk Transcatheter Versus Surgical Aortic Valve Replacement - An Updated Meta-Analysis of Randomized Controlled Trials. Cardiovasc Revasc Med. Apr 2020; 21(4): 441-452. PMID 31678116
66. Kundu A, Sardar P, Malhotra R, et al. Cardiovascular Outcomes with Transcatheter vs. Surgical Aortic Valve Replacement in Low-Risk Patients: An Updated Meta-Analysis of Randomized Controlled Trials. Cardiovasc Revasc Med. Apr 2020; 21(4): 453-460. PMID 31669113
67. Kolkailah AA, Doukky R, Pelletier MP, et al. Cochrane corner: transcatheter aortic valve implantation versus surgical aortic valve replacement for severe aortic stenosis in people with low surgical risk. Heart. Jul 2020; 106(14): 1043-1045. PMID 32482670
68. Zhou Y, Wang Y, Wu Y, et al. Transcatheter versus surgical aortic valve replacement in low to intermediate risk patients: A meta-analysis of randomized and observational studies. Int J Cardiol. Feb 01 2017; 228: 723-728. PMID 27886617
69. Thyregod HG, Steinbrüchel DA, Ihlemann N, et al. Transcatheter Versus Surgical Aortic Valve Replacement in Patients With Severe Aortic Valve Stenosis: 1-Year Results From the All-Comers NOTION Randomized Clinical Trial. J Am Coll Cardiol. May 26 2015; 65(20): 2184-94. PMID 25787196
70. Nielsen HH, Klaaborg KE, Nissen H, et al. A prospective, randomised trial of transapical transcatheter aortic valve implantation vs. surgical aortic valve replacement in operable elderly patients with aortic stenosis: the STACCATO trial. EuroIntervention. Jul 20 2012; 8(3): 383-9. PMID 22581299
71. Leon MB, Smith CR, Mack MJ, et al. Transcatheter or Surgical Aortic-Valve Replacement in Intermediate-Risk Patients. N Engl J Med. Apr 28 2016; 374(17): 1609-20. PMID 27040324
72. Kondur A, Briasoulis A, Palla M, et al. Meta-Analysis of Transcatheter Aortic Valve Replacement Versus Surgical Aortic Valve Replacement in Patients with Severe Aortic Valve Stenosis. Am J Cardiol. Jan 15 2016; 117(2): 252-7. PMID 26639040
73. Tamburino C, Barbanti M, D'Errigo P, et al. 1-Year Outcomes After Transfemoral Transcatheter or Surgical Aortic Valve Replacement: Results from the Italian OBSERVANT Study. J Am Coll Cardiol. Aug 18 2015; 66(7): 804-812. PMID 26271063
74. Siemieniuk RA, Agoritsas T, Manja V, et al. Transcatheter versus surgical aortic valve replacement in patients with severe aortic stenosis at low and intermediate risk: systematic review and meta-analysis. BMJ. Sep 28 2016; 354: i5130. PMID 27683246
75. Søndergaard L, Steinbrüchel DA, Ihlemann N, et al. Two-Year Outcomes in Patients with Severe Aortic Valve Stenosis Randomized to Transcatheter Versus Surgical Aortic Valve Replacement: The All-Comers Nordic Aortic Valve Intervention Randomized Clinical Trial. Circ Cardiovasc Interv. Jun 2016; 9(6). PMID 27296202
76. Thyregod HGH, Ihlemann N, Jørgensen TH, et al. Five-Year Clinical and Echocardiographic Outcomes from the Nordic Aortic Valve Intervention (NOTION) Randomized Clinical Trial in Lower Surgical Risk Patients. Circulation. Feb 01 2019. PMID 30704298
77. Søndergaard L, Ihlemann N, Capodanno D, et al. Durability of Transcatheter and Surgical Bioprosthetic Aortic Valves in Patients at Lower Surgical Risk. J Am Coll Cardiol. Feb 12 2019; 73(5): 546-553. PMID 30732707
78. Reardon MJ, Kleiman NS, Adams DH, et al. Outcomes in the Randomized CoreValve US Pivotal High Risk Trial in Patients With a Society of Thoracic Surgeons Risk Score of 7% or Less. JAMA Cardiol. Nov 01 2016; 1(8): 945-949. PMID 27541162
79. Reardon MJ, Van Mieghem NM, Popma JJ, et al. Surgical or Transcatheter Aortic-Valve Replacement in Intermediate-Risk Patients. N Engl J Med. Apr 06 2017; 376(14): 1321-1331. PMID 28304219

80. Popma JJ, Deeb GM, Yakubov SJ, et al. Transcatheter Aortic-Valve Replacement with a Self-Expanding Valve in Low-Risk Patients. N Engl J Med. May 02 2019; 380(18): 1706-1715. PMID 30883053
81. Forrest JK, Deeb GM, Yakubov SJ, et al. 2-Year Outcomes After Transcatheter Versus Surgical Aortic Valve Replacement in Low-Risk Patients. J Am Coll Cardiol. Mar 08 2022; 79(9): 882-896. PMID 35241222
82. Mack MJ, Leon MB, Thourani VH, et al. Transcatheter Aortic-Valve Replacement with a Balloon-Expandable Valve in Low-Risk Patients. N Engl J Med. May 02 2019; 380(18): 1695-1705. PMID 30883058
83. Leon MB, Mack MJ, Hahn RT, et al. Outcomes 2 Years After Transcatheter Aortic Valve Replacement in Patients at Low Surgical Risk. J Am Coll Cardiol. Mar 09 2021; 77(9): 1149-1161. PMID 33663731
84. Toff WD, Hildick-Smith D, Kovac J, et al. Effect of Transcatheter Aortic Valve Implantation vs Surgical Aortic Valve Replacement on All-Cause Mortality in Patients With Aortic Stenosis: A Randomized Clinical Trial. JAMA. May 17 2022; 327(19): 1875-1887. PMID 35579641
85. Jørgensen TH, Thyregod HGH, Ihlemann N, et al. Eight-year outcomes for patients with aortic valve stenosis at low surgical risk randomized to transcatheter vs. surgical aortic valve replacement. Eur Heart J. Aug 07 2021; 42(30): 2912-2919. PMID 34179981
86. Makkar RR, Thourani VH, Mack MJ, et al. Five-Year Outcomes of Transcatheter or Surgical Aortic-Valve Replacement. N Engl J Med. Feb 27 2020; 382(9): 799-809. PMID 31995682
87. Pibarot P, Salaun E, Dahou A, et al. Echocardiographic Results of Transcatheter Versus Surgical Aortic Valve Replacement in Low-Risk Patients: The PARTNER 3 Trial. Circulation. May 12 2020; 141(19): 1527-1537. PMID 32272848
88. Shahim B, Malaisrie SC, George I, et al. Postoperative Atrial Fibrillation or Flutter Following Transcatheter or Surgical Aortic Valve Replacement: PARTNER 3 Trial. JACC Cardiovasc Interv. Jul 26 2021; 14(14): 1565-1574. PMID 34294398
89. Aedma SK, Khan N, Altamimi A, et al. Umbrella Meta-analysis Evaluating the Effectiveness of ViV-TAVI vs Redo SAVR. SN Compr Clin Med. Feb 26 2022; 4(63). DOI: 10.1007/s42399-022-01136-x.
90. Raschpichler M, de Waha S, Holzhey D, et al. Valve-in-Valve Transcatheter Aortic Valve Replacement Versus Redo Surgical Aortic Valve Replacement for Failed Surgical Aortic Bioprostheses: A Systematic Review and Meta-Analysis. J Am Heart Assoc. Dec 20 2022; 11(24): e7965. PMID 36533610
91. Sá MP, Van den Eynde J, Simonato M, et al. Late outcomes of valve-in-valve transcatheter aortic valve implantation versus re-replacement: Meta-analysis of reconstructed time-to-event data. Int J Cardiol. Jan 01 2023; 370: 112-121. PMID 36370873
92. National Institute For Health And Care Excellence (NICE). Interventional procedure overview of valve-in-valve TAVI for aortic bioprosthetic valve dysfunction [IPG653]. June 2019. https://www.nice.org.uk/guidance/ipg653/evidence/overview-final-pdf-6834685357. Accessed January 1, 2023.
93. Phan K, Zhao DF, Wang N, et al. Transcatheter valve-in-valve implantation versus reoperative conventional aortic valve replacement: a systematic review. J Thorac Dis. Jan 2016; 8(1): E83-93. PMID 26904259
94. Chen HL, Liu K. Clinical outcomes for transcatheter valve-in-valve in treating surgical bioprosthetic dysfunction: A meta-analysis. Int J Cardiol. Jun 01 2016; 212: 138-41. PMID 27038719
95. Tam DY, Vo TX, Wijeysundera HC, et al. Transcatheter valve-in-valve versus redo surgical aortic valve replacement for the treatment of degenerated bioprosthetic aortic valve: A systematic review and meta-analysis. Catheter Cardiovasc Interv. Dec 01 2018; 92(7): 1404-1411. PMID 30024102
96. Webb JG, Murdoch DJ, Alu MC, et al. 3-Year Outcomes After Valve-in-Valve Transcatheter Aortic Valve Replacement for Degenerated Bioprostheses: The PARTNER 2 Registry. J Am Coll Cardiol. Jun 04 2019; 73(21): 2647-2655. PMID 31146808
97. Hahn RT, Webb J, Pibarot P, et al. 5-Year Follow-Up from the PARTNER 2 Aortic Valve-in-Valve Registry for Degenerated Aortic Surgical Bioprostheses. JACC Cardiovasc Interv. Apr 11 2022; 15(7): 698-708. PMID 35393102
98. van Steenbergen GJ, van Straten B, Lam KY, et al. Report on outcomes of valve-in-valve transcatheter aortic valve implantation and redo surgical aortic valve replacement in the Netherlands. Neth Heart J. Feb 2022; 30(2): 106-112. PMID 34373997

99. Haussig S, Mangner N, Dwyer MG, et al. Effect of a Cerebral Protection Device on Brain Lesions Following Transcatheter Aortic Valve Implantation in Patients with Severe Aortic Stenosis: The CLEAN-TAVI Randomized Clinical Trial. JAMA. Aug 09 2016; 316(6): 592-601. PMID 27532914
100. Van Mieghem NM, van Gils L, Ahmad H, et al. Filter-based cerebral embolic protection with transcatheter aortic valve implantation: the randomised MISTRAL-C trial. EuroIntervention. Jul 20 2016; 12(4): 499-507. PMID 27436602
101. Kapadia SR, Kodali S, Makkar R, et al. Protection Against Cerebral Embolism During Transcatheter Aortic Valve Replacement. J Am Coll Cardiol. Jan 31 2017; 69(4): 367-377. PMID 27815101
102. Kapadia SR, Makkar R, Leon M, et al. Cerebral Embolic Protection during Transcatheter Aortic-Valve Replacement. N Engl J Med. Oct 06 2022; 387(14): 1253-1263. PMID 36121045
103. Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC guideline for the management of patients with valvular heart disease: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. Jun 10 2014; 63(22): 2438-88. PMID 24603192
104. Nishimura RA, O'Gara PT, Bonow RO. Guidelines Update on Indications for Transcatheter Aortic Valve Replacement. JAMA Cardiol. Sep 01 2017; 2(9): 1036-1037. PMID 28768333
105. Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. Feb 02 2021; 77(4): e25-e197. PMID 33342586
106. National Institute For Health And Care Excellence (NICE).Valve-in-valve TAVI for aortic bioprosthetic valve dysfunction (Interventional procedures guidance [IPG653]). June 2019. https://www.nice.org.uk/guidance/ipg653. Accessed January 3, 2023.
107. National Institute For Health And Care Excellence (NICE). Heart valve disease presenting in adults: investigation and management [NG208]. November 2021. https://www.nice.org.uk/guidance/ng208/chapter/Recommendations#interventions. Accessed January 2, 2023.
108. Centers for Medicare and Medicaid Services (CMS). Decision Memo for Transcatheter Aortic Valve Replacement (TAVR) (CAG-00430R). https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=293. Accessed January 2, 2023.