

SUPPLEMENTAL MATERIAL

Supplemental Methods. Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database (ACSD)

variable definitions for TAVR-explant indications.

STS ACSD Versions 2.81 (effective 7/1/2014–6/30/2017) and 2.9 (effective 7/1/2017–6/30/2020)

Parent variable #3310 Valve Prosthesis Explant (ValExp) = “yes”

Variable #3325 Valve Explant Etiology (ValExpEt):

- 1=Endocarditis
- 2=Failed repair
- 3=Hemolysis
- 4=Incompetence
- 5=Pannus
- 6=Para-valvular leak
- 7=Prosthetic deterioration
- 8=Sizing/positioning issue
- 9=Stenosis
- 10=Thrombosis
- 11=Other
- 12=Unknown

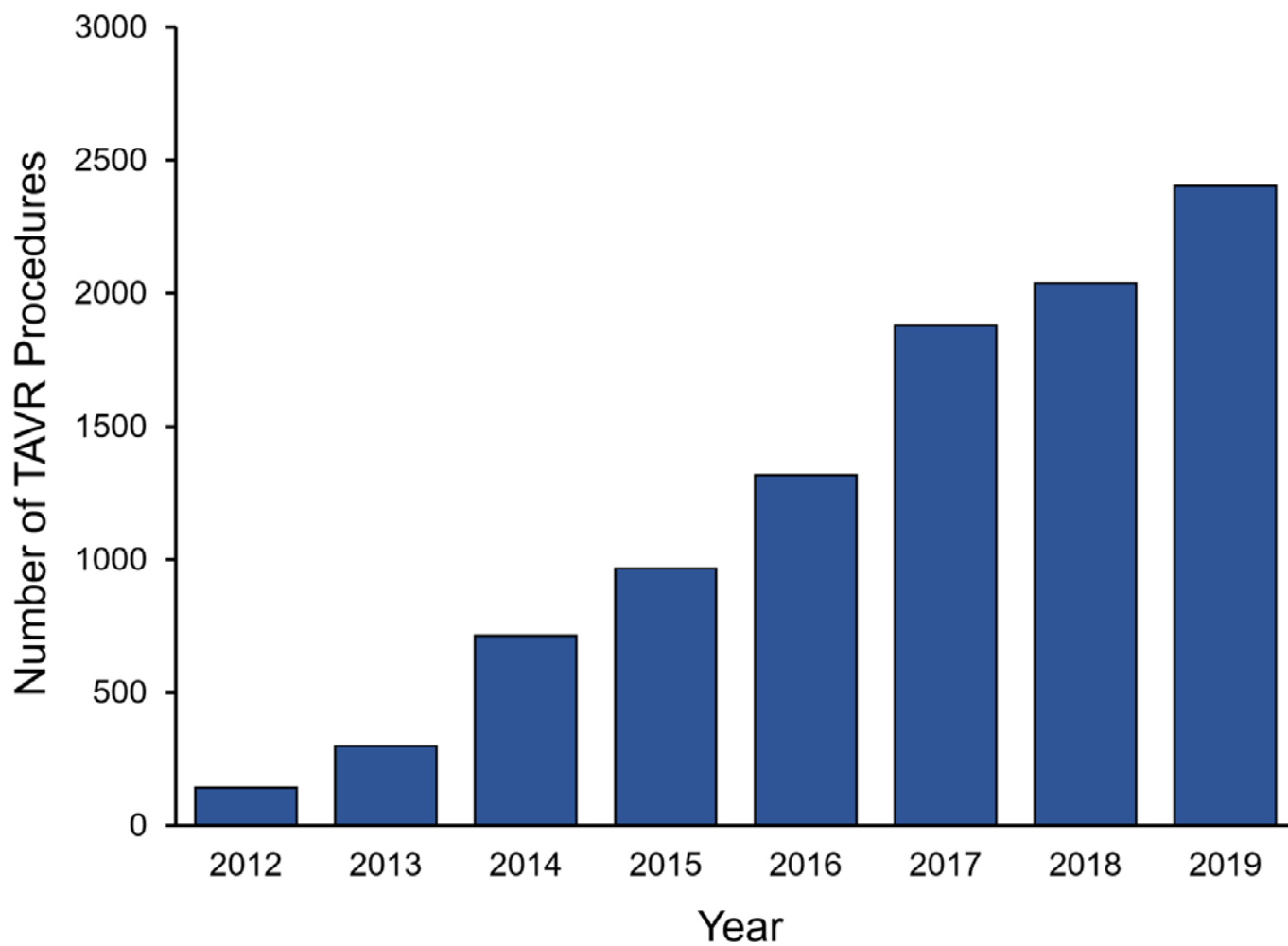
STS ACSD Version 2.73 (effective 7/1/2011–6/30/2014)

Parent variable #1216 Previous Valve (PrValve) = “yes”

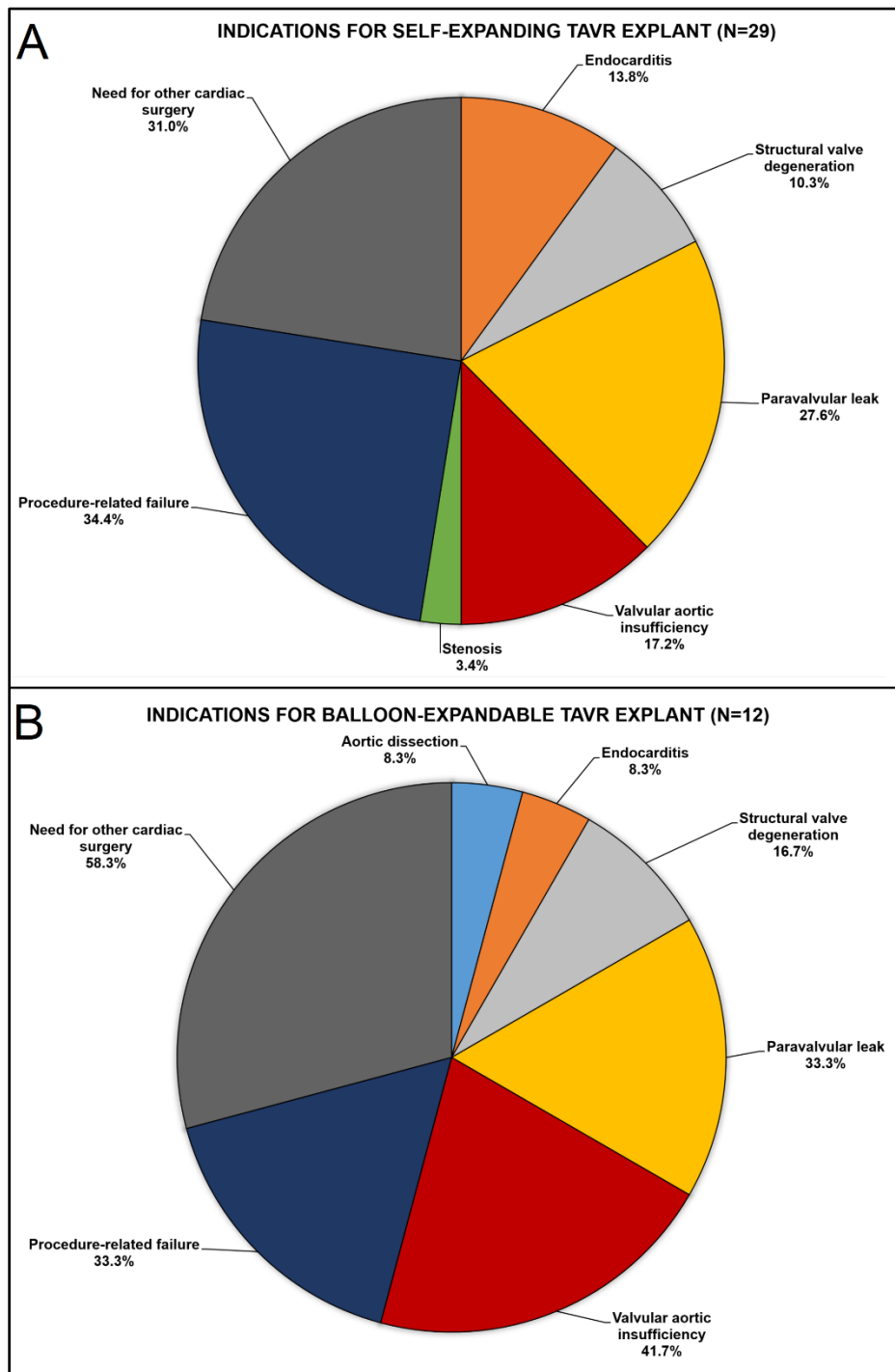
Variable #1340 Indication for Reoperation (IndReop):

- 1=Structural Prosthetic Valve Deterioration defined as wear, fracture, poppet escape, calcification, leaflet tear, stent creep
- 2=Non-structural prosthetic valve dysfunction defined as entrapment by pannus, paravalvular leak, obstruction, or inappropriate sizing
 - Variable #1350 Non-Structural Valve Dysfunction subcategories
 - 1=Paravalvular Leak
 - 2=Hemolysis
 - 3=Entrapment by pannus, tissue, or suture
 - 4=Sizing or positioning issue
 - 5=Other
- 3=Prosthetic valve endocarditis defined as infection, active or treated
- 4=Valve Thrombosis
- 5=Failed Repair
- 6=Repeat valve procedure on a different valve
- 7=Other

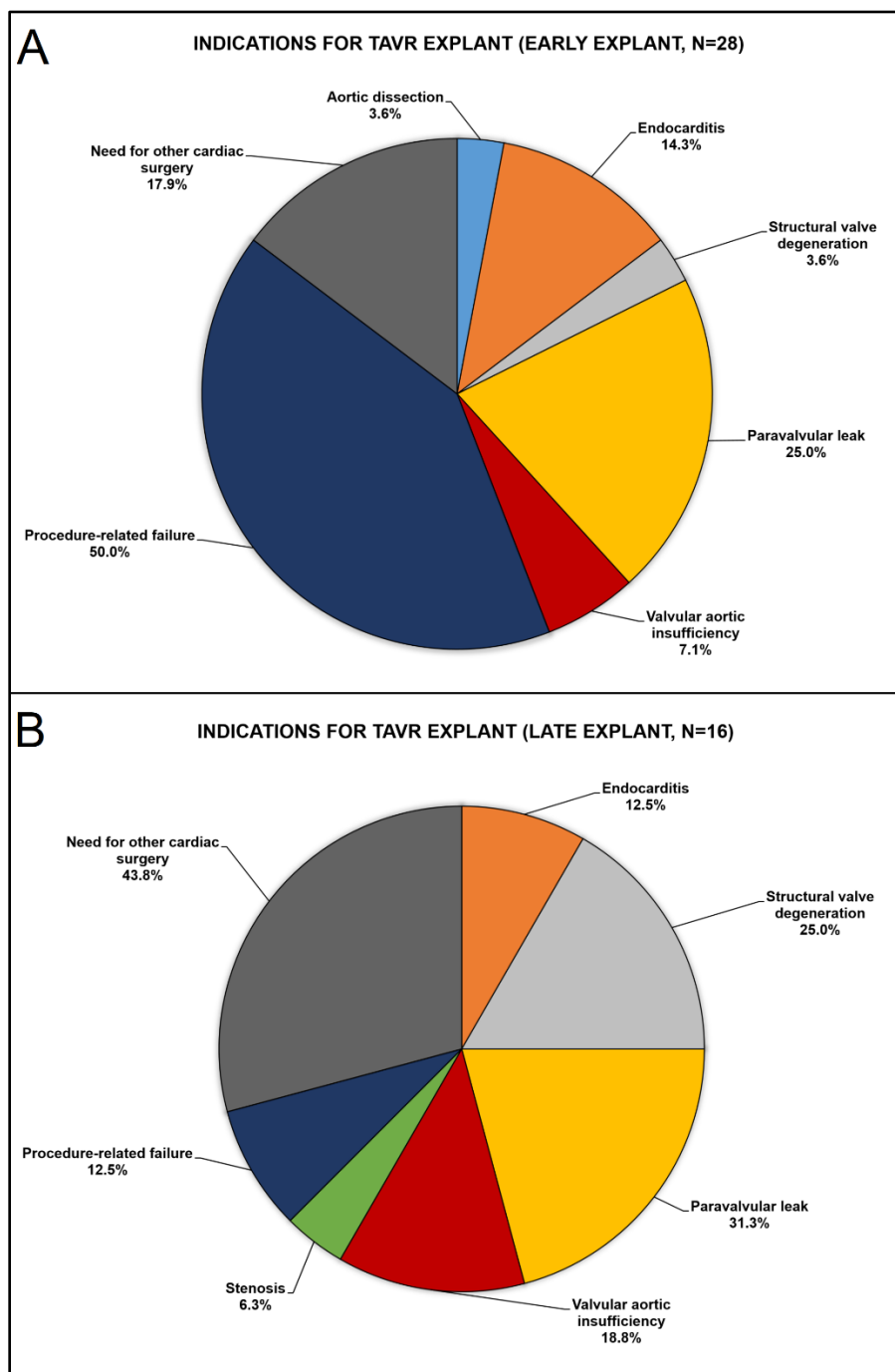
Supplemental Figure I. Number of transcatheter aortic valve replacement (TAVR) procedures per year (total, n=9,756) captured in the Michigan Transcatheter Valve Therapy (TVT) Registry.



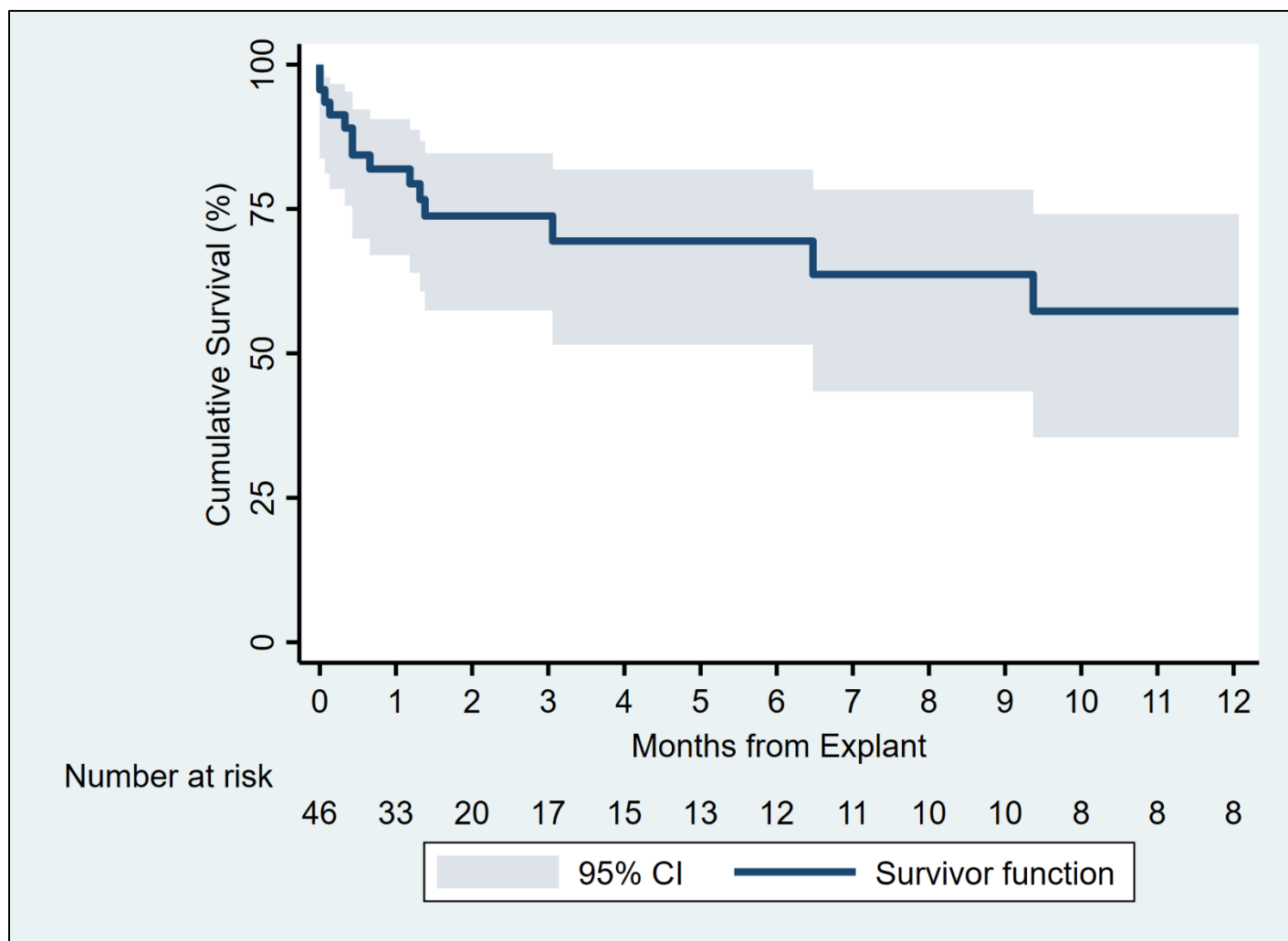
Supplemental Figure II. Indications for TAVR-explant by explanted valve type: A) self-expanding (n=29) and B) balloon-expandable (n=12). Explanted device type was known for 41/46 (89%) patients. Some patients had more than one indication for TAVR-explant.



Supplemental Figure III. Indications for TAVR-explant by valve age: A) early TAVR-explant (<1 year, n=28) and B) late explant (>1 year, n=16). Explanted device age was known for 44/46 (96%) patients. Some patients had more than one indication for TAVR-explant. All 11 patients who underwent TAVR-explant as an emergent/urgent conversion to surgery on the same day as index TAVR had a “problem with sizing or position” indication for TAVR-explant.



Supplemental Figure IV. Cumulative survival after surgical explantation of transcatheter aortic valve replacement (TAVR) valve.



Supplemental Table I. Patient characteristics and echocardiography data at time of primary transcatheter aortic valve replacement (TAVR) procedure. Data from the primary TAVR procedure were available for 42/46 (91%) of patients. Data available in less than 42 patients is noted next to the characteristic name.

Values are expressed as number (%) or median (interquartile range).

Characteristic	Overall (n=42)	Early Explant (<1 year, n=26)	Late Explant (>1 year, n=16)	P value
Infective endocarditis	2 (5)	1 (4)	1 (6)	1.00
Permanent pacemaker (n=41)	8 (20)	5 (19)	3 (20)	1.00
Prior CABG (n=41)	5 (12)	2 (8)	3 (20)	0.34
Prior other cardiac surgery (n=41)	3 (7)	2 (8)	1 (7)	1.00
Prior stroke (n=41)	6 (15)	4 (15)	2 (13)	1.00
Hostile chest (n=41)	5 (12)	2 (8)	3 (20)	0.34
Porcelain aorta	3 (7)	1 (4)	2 (13)	0.55
NYHA class within 2 weeks				
I	1 (2)	0	1 (6)	0.08
II	8 (19)	7 (27)	1 (6)	
III	20 (48)	11 (42)	9 (56)	
IV	11 (26)	8 (31)	3 (19)	
Unknown	2 (5)	0	2 (13)	
Median (interquartile range) STS risk of mortality at index TAVR (without incrementals)	4.2% (2.7–9.2)	3.5% (2.7–7.6)	5.1% (2.6–11.7)	0.28
Low (<4%)	19 (45)	14 (54)	5 (31)	0.36
Intermediate (4-8%)	11 (26)	6 (23)	5 (31)	
High (>8%)	12 (29)	6 (23)	6 (38)	
Operator risk classification at initial TAVR				
Low risk	0	0	0	0.045
Intermediate risk	14 (33)	11 (42)	3 (19)	
High risk	20 (48)	13 (50)	7 (44)	
Prohibitive/extreme risk	8 (19)	2 (8)	6 (38)	
Aortic valve annular calcification (n=40)	25 (63)	19 (76)	6 (40)	0.042
Primary TAVR indication (n=41)				
Primary aortic stenosis	26 (63)	17 (68)	9 (56)	0.70
Primary aortic insufficiency	1 (2)	1 (4)	0	

Mixed stenosis/insufficiency	0	0	0	
Failed bioprosthetic valve	14 (34)	7 (28)	7 (44)	
Mitral valve disease				
Mitral stenosis (n=37)	2 (5)	1 (4)	1 (8)	1.00
Mitral regurgitation (n=41)				
None	4 (10)	1 (4)	3 (19)	0.52
Trace/trivial	5 (12)	4 (16)	1 (6)	
Mild	19 (46)	12 (48)	7 (44)	
Moderate	8 (20)	5 (20)	3 (19)	
Moderate-to-Severe	4 (10)	3 (12)	1 (6)	
Severe	1 (2)	0	1 (6)	
Tricuspid regurgitation (n=40)				
None	0	0	0	0.62
Trace/trivial	11 (28)	8 (33)	3 (19)	
Mild	20 (50)	10 (42)	10 (63)	
Moderate	7 (18)	5 (21)	2 (13)	
Severe	2 (5)	1 (4)	1 (6)	
Valve-in-valve procedures (TAVR in bioprosthetic surgical valve)	14 (33)	7 (27)	7 (44)	0.32
Device implant type (n=41)				
Balloon-expandable	12 (29)	9 (36)	3 (19)	0.31
Self-expanding	29 (71)	16 (64)	13 (81)	
Post-procedure paravalvular insufficiency (n=34)				
None	21 (62)	11 (55)	10 (71)	0.62
Trace/trivial	0	0	0	
Mild	8 (24)	6 (30)	2 (14)	
Moderate	5 (15)	3 (15)	2 (14)	