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APPENDIX. SUPPLEMENTARY DATA

Table 1 of the supplementary data. Global and subgroup analysis of mortality (covariate matrix)

		Period				Hospital volume				Age, y			
		1998-2002	2003-2007	2008-2012	2013-2017	High	I-High	I-Low	Low	< 60	60-70	70-80	> 80
Period	1998-2002	6.7%				5.2%	6.8%	9.3%	7%	3.6%	5.9%	8.7%	10.9 %
	2003-2007		6.7%			4.9%	6.7%	7.8%	9.2%	3.2%	5.3%	8%	11.3 %
	2008-2012			5.4%		4.8%	5.4%	5.9%	6.4%	2.6%	3.9%	6.1%	8.4%
	2013-2017				3.8%	3.2%	3.6%	4.7%	4%	1.5%	2.7%	4.5%	5.2%
Hospital volume	High	5.2%	4.9%	4.8%	3.2%	4.4%				1.9%	3.3%	5.2%	6.3%
	I-High	6.8%	6.7%	5.4%	3.6%		5.4%			2.6%	4.5%	6.3%	8.4%
	I-Low	9.3%	7.8%	5.9%	4.7%			6.5%		3.5%	5.2%	8.1%	8.3%
	Low	7%	9.2%	6.4%	4%				6.5%	3.6%	5.5%	7.7%	9.3%
Age, y	<60	3.6%	3.2%	2.6%	1.5%	1.9%	2.6%	3.5%	3.6%	2.7%			
	60-70	5.9%	5.3%	3.9%	2,7%	3.3%	4.5%	5.2%	5.5%		4.4%		
	70-80	8.7%	8.0%	6.1%	4.5%	5.2%	6.3%	8.1%	7.7%			6.5%	
	>80	10.9%	11.3%	8.4%	5.2%	6.3%	8.4%	8.3%	9.2%				7.6%

I-High, intermediate-high; I-Low, intermediate-low.

All trend analyses within each variable were statistically significant ($P < .05$). All subgroup comparisons were statistically significant at $P < .016$ (Bonferroni's adjustment alpha/3).

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Table 2 of the supplementary data. Factors associated with the use of bioprostheses

	Univariate analysis		Multivariate analysis	
Variable	**OR (95%CI)**	***P***	**OR (95%CI)**	***P***
Period of time (vs 1998-2002)				
2003-2007	2.34 (2.22-2.47)	< .001	2.19 (2.07-2.31)	< .001
2008-2012	3.79 (3.61-3.99)	< .001	3.64 (3.45-3.86)	< .001
2013-2017	5.67 (5.4-5.96)	< .001	5.51 (5.21-5.83)	< .001
Age group (vs age < 60 y)				
60-70 y	3 (2.82-3.2)	< .001	2.99 (2.78-3.2)	< .001
70-80 y	11.93 (11.25-12.65)	< .001	12.02 (10.98-13.16)	< .001
≥ 80 y	21.85 (20.38-23.43)	< .001	17.99 (16.1-20.1)	< .001
Female sex	1.38 (1.34-1.42)	< .001	0.96 (0.93-0.99)	.02
Coronary heart disease	1.22 (1.16-1.28)	< .001		
Previous MI	0.7 (0.62-0.79)	< .001	0.81 (0.7-0.95)	.01
Diabetes	1.4 (1.35-1.45)	.001		
Peripheral vascular disease	0.8 (0.76-0.85)	< .001	0.84 (0.78-0.89)	< .001
Chronic kidney disease	1.37 (1.33-1.41)	< .001		
COPD	1.12 (1.07-1.18)	< .001	0.92 (0.87-0.98)	.008
Cancer	1.71 (1.51-1.92)	< .001	1.24 (1.07-1.44)	.004
Cerebrovascular disease	1.36 (1.26-1.47)	< .001		
Congestive cardiac failure	1.02 (0.99-1.07)	.303		
Dementia	1.86 (1.24-2.77)	< .001		
Previous cardiac surgery	0.8 (0.73-0.86)	< .001	0.82 (0.75-0.91)	< .001
Liver disease	0.99 (0.9-1.09)	.062		
Charlson index				
3	4.56 (4.26-4.66)	< .001	1.08 (1.1-1.16)	.03
4	6.58 (6.28-6.89)	< .001	1.08 (0.99: 1.18)	.076
>4	7.89 (7.51-8.28)	< .001	1.09 (0.98-1.22)	.127
Nonelective procedure	0.88 (0.85-0.91)	< .001	1.12 (1.07-1.17)	< .001
Hospital volume (vs high-volume)				
Intermediate-high	0.68 (0.66-0.71)	< .001	0.62 (0.64-0.69)	< .001
Intermediate-how	0.6 (0.57-0.62)	< .001	0.54 (0.52-0.57)	< .001
Low	0.46 (0.44-0.48)	< .001	0.42 (0.4-0.44)	< .001

95%CI, 95% confidence interval; COPD, chronic obstructive pulmonary disease; MI, myocardial infarction; OR, odds ratio.

Data are expressed as ORs with 95%CIs.

Univariate analysis: logistic regression. Multivariate analysis: stepwise logistic regression.

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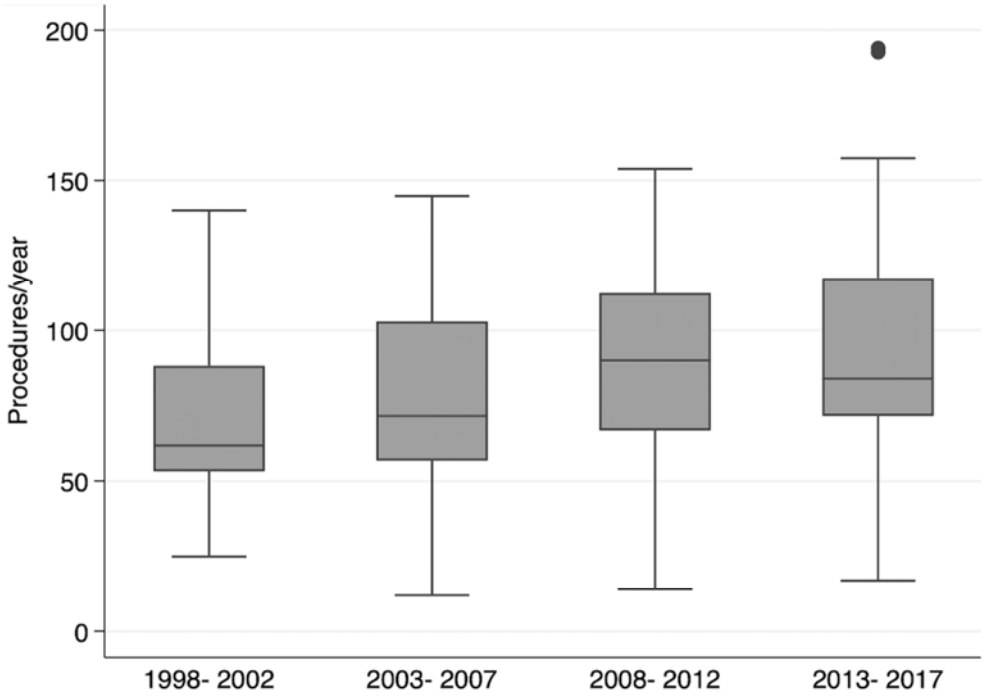
Figure 1 of the supplementary data. Distribution in the SAVR volume according to the mean number of procedures/y in each period. Box plots of the mean number of procedures/y in each period and in hospitals grouped according to the mean number of isolated SAVRs/y. Low-volume hospitals are those with a mean SAVR/y in the first quartile. Intermediate–low-volume hospitals are those with a mean SAVR/y in the second quartile. Intermediate–high-volume hospitals are those with a mean SAVR/y in the third quartile. High-volume hospitals are those with a mean SAVR/y in the fourth quartile. N, number of hospitals reporting to the CMBD; SAVR, surgical aortic valve replacement.



Volume	n=40	n=47	n=47	n=50
Low Volume	≤53.2 SAVR/year (n=9)	≤56.8 SAVR/year (n=11)	≤66.8 SAVR/year (n=11)	≤71.6 SAVR/year (n=12)
Intermediate/ Low Volume	>53.2 & ≤61.8 SAVR/year (n=9)	>56.8 & ≤71.6 SAVR/year (n=12)	>66.8 & ≤90 SAVR/year (n=12)	>71.6 & ≤84 SAVR/year (n=12)
Intermediate/ High Volume	>61.8 & ≤88.2 SAVR/year (n=11)	>71.6 & ≤103 SAVR/year (n=12)	>90 & ≤112.4 SAVR/year (n=12)	>84 & ≤117.4 SAVR/year (n=13)
High Volume	>88.2 SAVR/year (n=11)	>103 SAVR/year (n=12)	>112.4 SAVR/year (n=12)	>117.4 SAVR/year (n=13)

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Figure 2 of the supplementary data. Joint regression analysis or mortality trend. * indicates that the annual percentage change (APC) is significantly different from 0 at alpha level = 0.05.

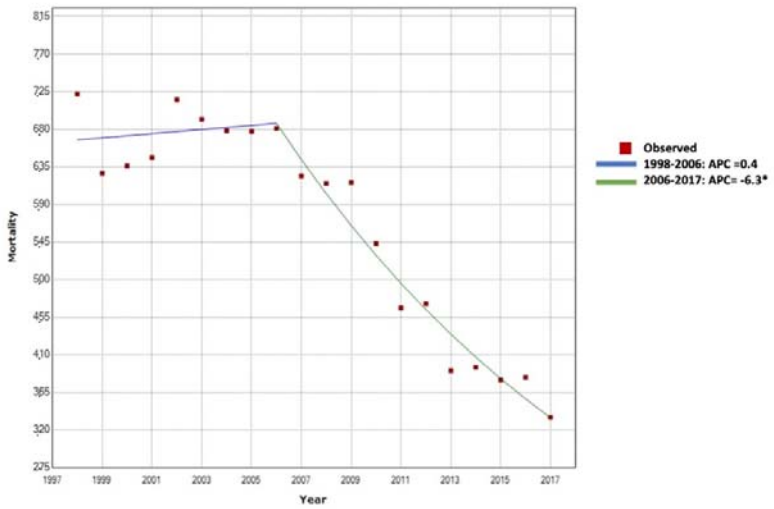

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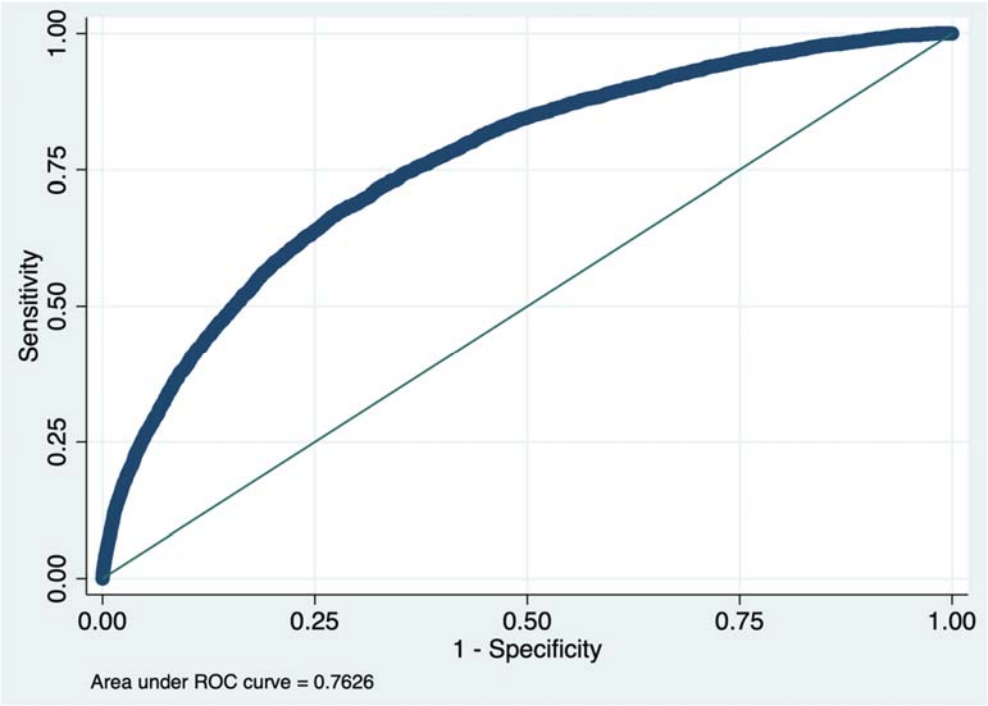
Figure 3 of the supplementary data. Risk-adjusted mortality ratio (RAMR) model with the area under the receiving operating characteristic curve. Variables included in the model to estimate expected mortality: age (by decade), sex, coronary disease, previous myocardial infarction, congestive cardiac failure, peripheral arterial disease, cerebrovascular disease, chronic kidney disease, modified Charlson score, type of admission, previous cardiac surgery, type of aortic prosthesis, hospital volume quartile, and autonomous community. AUC, 0.763; 95%CI, 0.761-0.765; Akaike information criterion, 27501.4.



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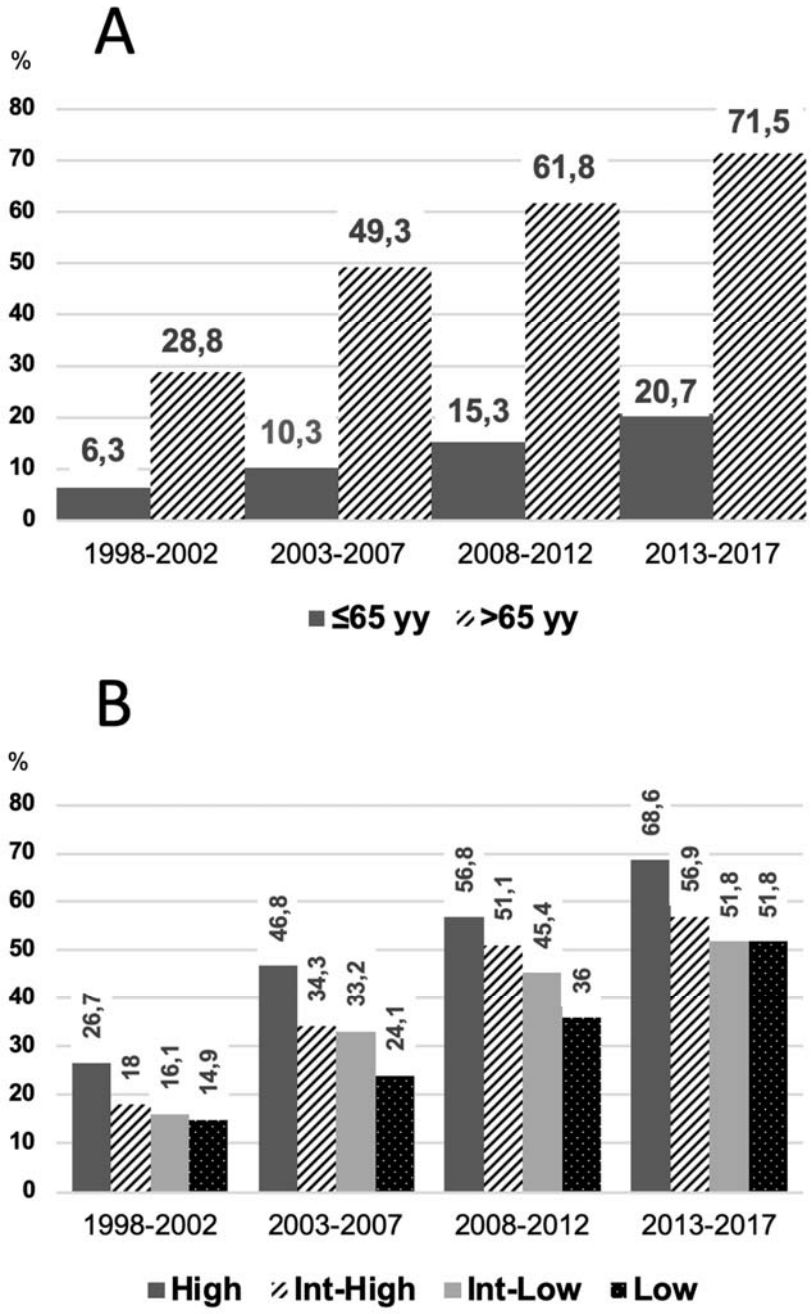
Figure 4 of the supplementary data. Changes in the proportion of bioprosthesis use among SAVR patients. A: proportion (%) of bioprostheses among patients younger and older than 65 years. In both age groups, an increase was observed in the use of tissue valves (*P* < .001). B: proportion (%) of bioprostheses in the 4 periods of the study and according to the SAVR center volume. We detected an increase in the use of tissue valves in high-volume (*P* < .001), intermediate–high-volume (*P* <.001), intermediate–low-volume (*P* < .001), and low-volume (*P* < .001) centers. Within each period, we observed a linear statistically significant increase in the use of tissue valves in higher-volume centers.