Perioperative care differences of surgical aortic valve replacement between North America and Europe

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Original research

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ABSTRACT

Objective To describe differences between North America and Europe in the perioperative management of patients undergoing surgical aortic valve replacement (SAVR).

Methods Patients with moderate or greater aortic stenosis or regurgitation requiring SAVR were enrolled in a prospective observational cohort evaluating the safety and efficacy of a new stented bioprosthesis at 25 centres in North America (Canada and the USA) and 13 centres in Europe (Germany, the Netherlands, France, the UK, Switzerland and Italy). While all patients underwent implantation with the same bioprosthetic model, perioperative management was left to the discretion of participating centres. Perioperative care was described in detail including outcomes up to 1-year follow-up.

Results Among 1118 patients, 643 (58%) were implanted in North America, and 475 (42%) were implanted in Europe. Patients in Europe were older, had a lower body mass index, less bicuspid disease and worse degree of aortic stenosis at baseline. In Europe, anticoagulant therapy at discharge was more aggressive, whereas length of stay was longer, and discharges directly to home were less common. Rehospitalisation risk was lower in Europe at 30 days (8.5% vs 15.9%) but converged at 1-year follow-up (26.5% vs 28.1%). Within continents, there were major differences between individual countries concerning perioperative management.

Conclusion Contemporary perioperative management of SAVR patients varies between North America and Europe in patient selection, procedural techniques, antithrombotic regimen and discharge management. Furthermore, rehospitalisation differed largely between continents and countries. Hence, geographical setting must be considered during design and interpretation of trials on SAVR.

Trial registration number NCT02088554.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ North America and Europe have separate guidelines for the perioperative management of patients requiring surgical aortic valve replacement, but the extent of practical differences between these continents is unknown.

WHAT THIS STUDY ADDS

⇒ This study provides a comprehensive overview of regional differences in perioperative care for these patients.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study outlined that perioperative care differed to a great extent in terms of patient selection, procedural techniques, antithrombotic regimen and discharge management between North America and Europe. These differences must be considered by regional policy makers, especially European guideline committees.

INTRODUCTION

North America and Europe have separate guidelines for the perioperative management of patients requiring surgical aortic valve replacement (SAVR),[1 2] but the extent of clinical care differences between these continents is unknown. For example, differences in procedural characteristics or antithrombotic regimen affect treatment outcomes; hence, the results of trials executed on different continents could inherently be influenced. As major randomised controlled trials primarily enrolled patients in the USA,[3 4] intercontinental differences in perioperative management might challenge the generalisability of results across different regions.

In a large prospective, non-randomised study evaluating the safety and efficacy of a new stented bioprosthesis, patients were enrolled at 38 centres in North America and Europe. All patients underwent SAVR with the same stented aortic bioprosthesis, while perioperative management was left to the discretion of the participating centres. Our aim was to describe the regional perioperative care in detail to examine comparability and subsequent generalisability of outcomes.

METHODS

The PERIcardial SurGical AOrtic Valve ReplaceMeNt (PERIGON) Pivotal Trial of the Avalus valve (Medtronic, Minneapolis, Minnesota, USA; www.clinicaltrials.gov, NCT02088554) is a single-armed follow-up study executed at 25 centres in North America (Canada and USA) and 13 centres in Europe (Germany, Netherlands, France, UK, Switzerland and Italy). In this trial, clinical and haemodynamic outcomes were investigated in patients receiving the Avalus bioprosthesis, a stented bovine

pericardial aortic valve. Patients were enrolled between 2014 and 2017 for all valve sizes. Enrolment was reopened in 2019 for size 29 mm and continues through early 2023. Previously, a detailed description of the study design was provided.[5 6] In brief, symptomatic patients with a clinical indication for AVR due to either moderate or severe aortic stenosis (AS) or severe chronic regurgitation were eligible. Several concomitant procedures were allowed, such as coronary artery bypass grafting (CABG). At each centre, an ethics committee or institutional review board approved the study (see online supplemental files of Klautz *et al*[7] for approval number and date for each participating centre), and all patients gave written informed consent. An independent clinical events committee was constituted to adjudicate all deaths and valve-related adverse events, while an independent data and safety monitoring board provided study surveillance (Baim Institute for Clinical Research, Boston, Massachusetts, USA). Furthermore, a core laboratory (MedStar, Washington, DC, USA) evaluated all echocardiographic assessments.

Our primary objective was to describe clinical care differences between North America and Europe. Moreover, a per-country subanalysis was performed.

Comprehensive baseline and procedural characteristics were outlined to provide a detailed overview of practical differences. In addition, the antithrombotic regimens and discharge strategies were investigated. Lastly, early clinical endpoints at 30-day and 1-year follow-up were demonstrated. These endpoints included all-cause rehospitalisation, all-cause mortality, cardiac mortality, valve-related mortality, thromboembolism, haemorrhage, paravalvular leak and reintervention.

Statistical analysis

Numerical data were expressed as mean±SD or median (IQR) and compared with the independent samples t-test or Mann-Whitney U test. Categorical data were summarised as counts (frequencies) and compared with the χ^2/Fisher's exact test. Early clinical event rates up to 1 year of follow-up, including their 95% CIs, were estimated using the Kaplan-Meier method. Follow-up for this analysis started at the time of surgery and continued until death, withdrawal or 1 year after surgery, whichever came first. Clinical outcomes were described but not compared, as the aim of this study was exploring clinical care differences rather than confirming superiority of one continent. At 30-day and 1-year follow-up, data were complete for 99.6% and 93.3%, respectively. A complete case analysis was executed. Statistical tests were executed using SAS V.9.4 (SAS Institute). All tests were two tailed, and a p value below 0.05 was considered statistically significant. Patients were not involved in the design or analysis of the study. The data underlying this article were provided by the sponsor and will not be shared with third parties for purposes of reproducing the results.

RESULTS

Out of a total of 1118 implanted patients, 643 (58%) were implanted in North America and 475 (42%) in Europe. Three hundred and seventy-five patients were implanted in the USA and 268 in Canada. In Europe, the majority of patients were enrolled in Germany (n=213), followed by the Netherlands (n=114), France (n=86), the UK (n=45), Switzerland (n=12) and Italy (n=5).

Per-continent analysis

Patients who underwent SAVR in North America had on average lower age, higher body surface area and higher body mass index (table 1). The Society of Thoracic Surgeons (STS) risk of mortality was also significantly lower. North American patients had more dyslipidaemia but less peripheral vascular disease, chronic obstructive pulmonary disease, congestive heart failure and left ventricular hypertrophy than European patients. However, bicuspid aortic valve was more frequent in North America. The primary indication for intervention was significantly different between the continents. Lastly, the mean aortic pressure gradient was lower, and the effective orifice area larger in North America.

The surgical approach was different with a high percentage of conventional median sternotomy in North America (table 2). The more popular minimally invasive strategy of choice was a hemisternotomy in Europe but a right anterior thoracotomy in North America. Non-everted mattress sutures and pledget use were common in North America, while simple interrupted sutures were more popular in Europe. Concomitant procedures were comparable between continents. While bypass time

Table 1 Baseline characteristics of patients undergoing surgical aortic valve replacement in North America and Europe

	North America (n=643)	Europe (n=475)	P value
Age (years)	68.6±9.7	72.3±7.4	<0.001
Male	494 (76.8)	345 (72.6)	0.11
Body surface area (m^2)	2.0±0.2	1.9±0.2	<0.001
Body mass index (kg/m^2)	30.2±5.9	28.3±4.5	<0.001
NYHA class III/IV	276 (42.9)	196 (41.3)	0.58
STS risk of mortality (%)	1.8±1.2	2.2±1.5	<0.001
Diabetes mellitus	177 (27.5)	121 (25.5)	0.44
Hypertension	489 (76.0)	363 (76.4)	0.89
Dyslipidaemia	453 (70.5)	237 (49.9)	<0.001
Peripheral vascular disease	38 (5.9)	43 (9.1)	0.045
Renal dysfunction/insufficiency	59 (9.2)	60 (12.6)	0.06
Stroke/CVA	27 (4.2)	18 (3.8)	0.73
TIA	31 (4.8)	29 (6.1)	0.35
COPD	60 (9.3)	70 (14.7)	0.005
Congestive heart failure	102 (15.9)	120 (25.3)	<0.001
Coronary artery disease	283 (44.0)	203 (42.7)	0.67
Myocardial infarction	58 (9.0)	41 (8.6)	0.82
Left ventricular hypertrophy	158 (24.6)	300 (63.2)	<0.001
Atrial fibrillation	64 (10.0)	53 (11.2)	0.52
Liver disease	15 (2.3)	9 (1.9)	0.62
Bicuspid aortic valve	256 (39.8)	73 (15.4)	<0.001
Aortic aneurysm	65 (10.1)	33 (6.9)	0.06
Primary indication			<0.001
Aortic stenosis	540 (84.0)	402 (84.6)	
Aortic regurgitation	49 (7.6)	15 (3.2)	
Mixed	49 (7.6)	57 (12.0)	
Failed prosthesis	5 (0.8)	1 (0.2)	
Smoking	307 (47.7)	231 (48.6)	0.77
Substance abuse (drug or alcohol)	17 (2.6)	6 (1.3)	0.11
Mean pressure gradient (mm Hg)	40.4±17.9	44.4±15.7	<0.001
Effective orifice area (cm^2)	0.80 (0.65–1.00)	0.74 (0.62–0.89)	<0.001

Data are either presented as mean±SD, median (IQR) or counts (percentages) and compared with the independent samples t-test, Mann-Whitney U test or χ^2/Fisher's exact test, respectively.
COPD, chronic obstructive pulmonary disease; CVA, cerebrovascular accident; NYHA, New York Heart Association; STS, Society of Thoracic Surgeons; TIA, transient ischaemic attack.

Table 2 Procedural characteristics of patients undergoing surgical aortic valve replacement in North America and Europe

	North America (n=643)	Europe (n=475)	P value
Surgical approach			<0.001
Median sternotomy	547 (85.1%)	343 (72.2%)	
Hemisternotomy	37 (5.8%)	108 (22.7%)	
Right anterior thoracotomy	52 (8.1)	17 (3.6)	
Other	7 (1.1)	7 (1.5)	
Suturing technique valve implantation			
Simple interrupted	61 (9.5%)	262 (55.2%)	<0.001
Continuous	2 (0.3%)	39 (8.2%)	<0.001
Pledgets	441 (68.6%)	217 (45.7%)	<0.001
Everted mattress	40 (6.2%)	24 (5.1%)	0.41
Non-everted mattress	536 (83.4%)	146 (30.7%)	<0.001
Figure-of-eight	3 (0.5%)	0 (0.0%)	0.27
Cor-knot	144 (22.4%)	24 (5.1%)	<0.001
Other	14 (2.2%)	9 (1.9%)	0.74
Number of sutures	14.3±3.0	15.8±7.9	0.015
Implanted valve size			0.28
17 mm	0 (0.0%)	1 (0.2%)	
19 mm	26 (4.0%)	16 (3.4%)	
21 mm	124 (19.3%)	87 (18.3%)	
23 mm	212 (33.0%)	189 (39.8%)	
25 mm	211 (32.8%)	139 (29.3%)	
27 mm	60 (9.3%)	41 (8.6%)	
29 mm	10 (1.6%)	2 (0.4%)	
Annular enlargement	16 (3.8%)	11 (6.1%)	0.22
Nicks procedure	11 (2.6%)	8 (4.4%)	0.25
Konno procedure	0 (0.0%)	0 (0.0%)	NA
Other	5 (1.2%)	3 (1.7%)	0.70
Aortic root/STJ enlargement	68 (16.2%)	14 (7.7%)	0.005
Patch closure	39 (9.3%)	13 (7.1%)	0.38
Aortic root replacement	3 (0.7%)	0 (0.0%)	0.56
Other	27 (6.4%)	1 (0.5%)	<0.001
Concomitant procedures			
None	305 (47.4%)	246 (51.8%)	0.15
CABG	216 (33.6%)	146 (30.7%)	0.31
Implantable cardiac device (pacemaker, ICD, CRT, etc)	0 (0.0%)	1 (0.2%)	0.42
LAA closure	53 (8.2%)	34 (7.2%)	0.50
PFO closure	11 (1.7%)	2 (0.4%)	0.05
Resection of subaortic membrane not requiring myectomy	3 (0.5%)	18 (3.8%)	<0.001
Ascending aortic aneurysm not requiring circulatory arrest	58 (9.0%)	28 (5.9%)	0.05
Dissection repair not requiring circulatory arrest	0 (0.0%)	1 (0.2%)	0.42
Other	96 (14.9%)	63 (13.3%)	0.43
Total bypass time (min)	105.8±40.7	104.0±41.7	0.48
Total aortic cross clamp time (min)	81.6±32.0	76.6±30.8	0.010

Data are either presented as mean±SD, median (IQR) or counts (percentages) and compared with the independent samples t-test, Mann-Whitney U test or χ^2/Fisher's exact test, respectively.
CABG, coronary artery bypass grafting; CRT, cardiac resynchronisation therapy; ICD, implantable cardioverter-defibrillator; LAA, left atrial appendage; NA, not available; PFO, patent foramen ovale; STJ, sinotubular junction.

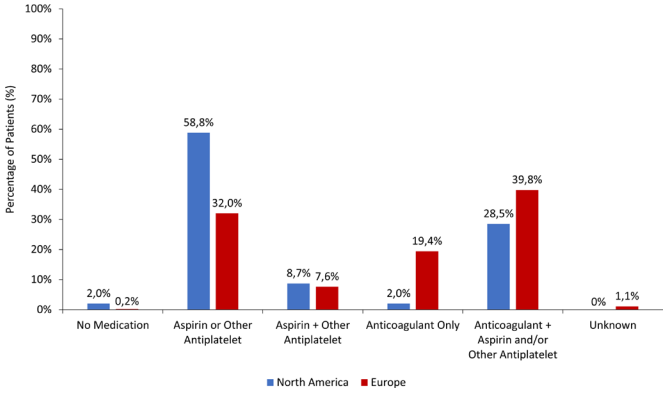

Figure 1 Antithrombotic medication at discharge in North America and Europe for patients who underwent surgical aortic valve replacement.

was also similar, aortic cross-clamp time was somewhat longer in North America.

In North America, more patients received aspirin or other antiplatelet monotherapy (figure 1). In Europe, oral anticoagulant (OAC) use was more common, both alone and in combination with aspirin and/or and 'other' antiplatelet drug. The average length of hospital stay was shorter in North America (6.9 days vs 10.0 days in Europe (table 3)). In addition, more than 90% of the North American patients went home directly after their initial hospital stay. In Europe, despite their longer stay, most patients were discharged to a rehabilitation clinic (55.8%) or other hospital (19.8%). All-cause rehospitalisation risk was higher in North America at 30 days (15.9%, 95% CI 13.3% to 18.9% vs Europe 8.5%, 95% CI 6.3% to 11.4%); however, the risks became more comparable between continents throughout 1-year follow-up (figure 2). At 30-day and 1-year follow-up, thromboembolism risks were comparable, while all and major haemorrhage risks were different between the continents (table 4).

Per-country analysis

Patient age in France and the UK was relatively high (online supplemental table S1). In accordance, the STS risk of mortality was higher in these countries. In online supplemental table S2, the procedural characteristics per country are shown. A surgical approach via hemisternotomy was most commonly used in Germany, while a right anterior thoracotomy was most frequently used in the UK. Within Europe, pledget-reinforced sutures were used markedly more often in Germany (87.3%) and in Switzerland (83.3%) compared with the other European countries (13.2% at most). In the USA, application of the Cor-knot (LSI Solutions, Victor, New York, USA), an automated suture fastener, was popular. In Germany, annular enlargement was performed remarkably more in contrast to all other countries, while in Canada, 27.5% of patients underwent an aortic root enlargement.

In France, the antithrombotic regimen was most liberal with almost 70% of patients receiving an OAC plus aspirin and/or other antiplatelet therapy (online supplemental figure S1). The length of stay per country ranged from a mean of 5–12 days (table 3). In most European countries, the majority of patients were discharged to a rehabilitation clinic; however, in the Netherlands, most patients were transferred to another hospital after their initial stay, and most patients in UK were discharged to home. Rehospitalisation per country varied widely at both

Table 3 Discharge data per continent and per country for patients who underwent surgical aortic valve replacement

	Per continent		Per country							
	North America (n=643)	Europe (n=475)	USA (n=375)	Canada (n=268)	Germany (n=213)	Netherlands (n=114)	France (n=86)	UK (n=45)	Switzerland (n=12)	Italy (n=5)
Length of stay (days)	6.9±4.3	10.0±5.3	6.8±4.8	7.1±3.5	11.6±5.1	6.8±4.3	11.2±4.5	9.3±6.1	9.3±4.4	5.2±0.8
Discharge location										
Home	568 (90.6)	110 (24.4)	328 (91.1)	240 (89.9)	20 (10.2)	47 (42.3)	1 (1.2)	41 (93.2)	0 (0.0)	1 (20.0)
Rehabilitation clinic	49 (7.8)	251 (55.8)	31 (8.6)	18 (6.7)	158 (80.2)	0 (0.0)	76 (93.8)	1 (2.3)	12 (100.0)	4 (80.0)
Other hospital	10 (1.6)	89 (19.8)	1 (0.3)	9 (3.4)	19 (9.6)	64 (57.7)	4 (4.9)	2 (4.5)	0 (0.0)	0 (0.0)

Data are either presented as mean±SD or counts (percentages).

30-day (online supplemental table S3) and 1-year follow-up (figure 2). Moreover, thromboembolism risks at 30-day and 1-year follow-up differed between the countries with the highest occurrence in the UK (online supplemental table S3). The cumulative incidence of all anticoagulant-related haemorrhage was highest in Germany (8.8%, 95% CI 5.7% to 13.7%) at 1 year, while the major haemorrhage risk was highest in the USA (5.4%, 95% CI 3.5 to 8.3%).

DISCUSSION

In a large observational trial executed at 38 centres across North America and Europe, continental and national differences were analysed. This is the first study that investigated perioperative care for SAVR patients and differences in patient selection, procedural characteristics and discharge strategy were found between continents and countries. As these differences

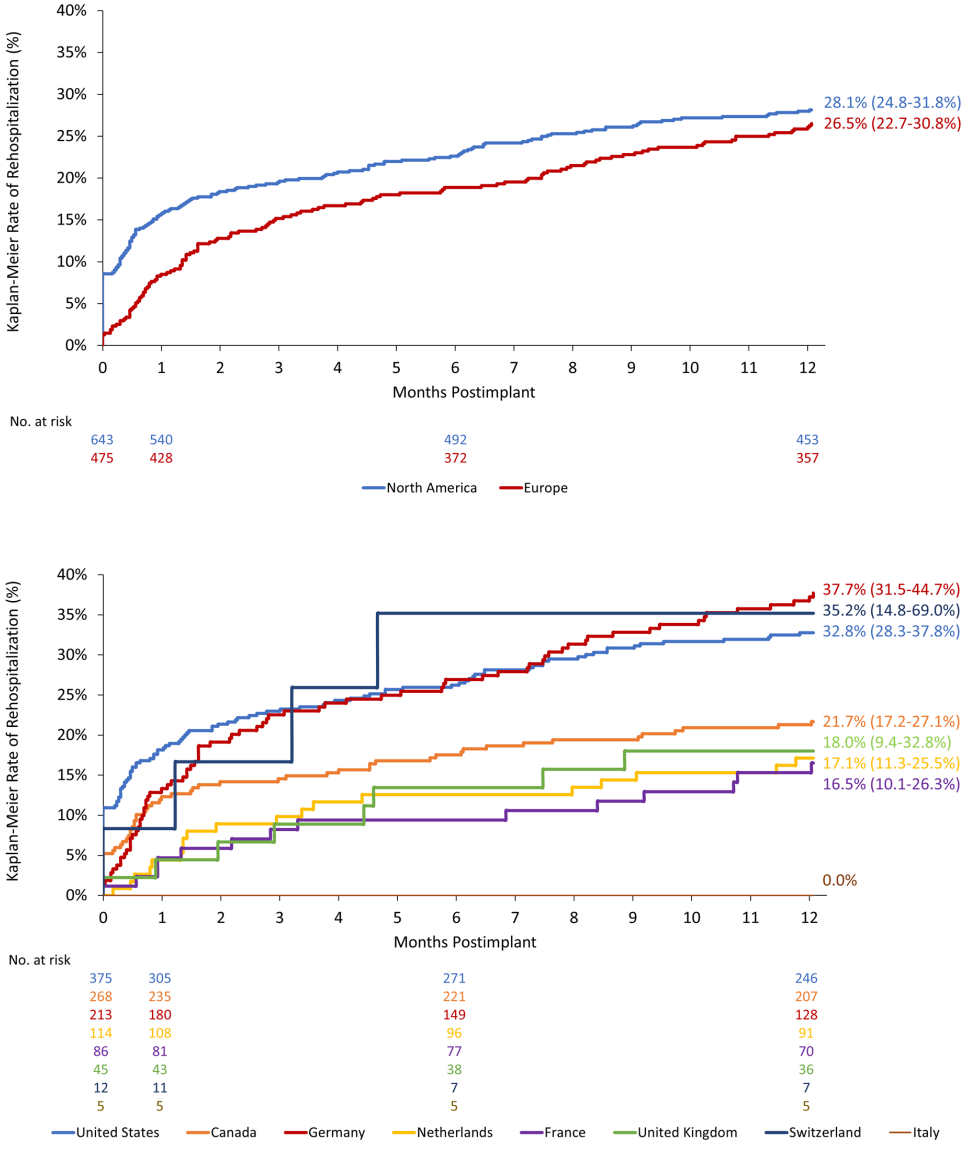

Figure 2 Kaplan-Meier analysis for rehospitalisation up to 1-year follow-up per continent and per country for patients who underwent surgical aortic valve replacement. The upper panel represents the per-continent analysis, while the lower panel represents the per-country analysis.

Table 4 Thirty-day and 1-year outcomes for patients who underwent surgical aortic valve replacement in North America and Europe

	30 days		1 year	
	North America (n=643)	Europe (n=475)	North America (n=643)	Europe (n=475)
All-cause mortality	0.3% (0.1% to 1.2%)	1.7% (0.8% to 3.3%)	2.4% (1.4% to 3.9%)	4.0% (2.6% to 6.3%)
Cardiac mortality	0.3% (0.1% to 1.2%)	0.8% (0.3% to 2.2%)	0.9% (0.4% to 2.1%)	2.6% (1.5% to 4.5%)
Valve-related mortality	0.0% (NA)	0.0% (NA)	0.2% (0.0% to 1.1%)	0.4% (0.1% to 1.8%)
Thromboembolism	1.4% (0.7% to 2.7%)	1.3% (0.6% to 2.8%)	2.5% (1.5% to 4.1%)	3.0% (1.8% to 5.1%)
All haemorrhage*	0.0% (NA)	0.0% (NA)	4.7% (3.3% to 6.7%)	5.9% (4.1% to 8.5%)
Major haemorrhage*	2.0% (1.2% to 3.5%)	0.9% (0.3% to 2.3%)	4.1% (2.8% to 6.0%)	2.6% (1.5% to 4.6%)
All paravalvular leak	1.7% (1.0% to 3.1%)	0.0% (NA)	1.0% (0.4% to 2.1%)	0.0% (NA)
Major paravalvular leak	0.3% (0.1% to 1.2%)	0.0% (NA)	0.3% (0.1% to 1.3%)	0.0% (NA)
Reintervention	0.3% (0.1% to 1.2%)	0.4% (0.1% to 1.7%)	0.8% (0.3% to 1.9%)	1.1% (0.5% to 2.6%)

Data are expressed as Kaplan-Meier event rates, including 95% CI.
*Anticoagulant-related only.
NA, not applicable.

affect trial outcomes, they potentially diminish generalisability of surgical trials performed exclusively or predominantly in a specific region. This form of bias needs to be considered in the interpretation of surgical trials and is of importance for national and international guideline committees.

Generalisability of the effects of surgical interventions, including aortic valve replacement, is not straightforward if intervention effects possibly differ between groups of patients or practice characteristics. In trials, commonly, average treatment effects are estimated and apply to patient groups that are represented in that trial. Generalising results to patient populations with different characteristics or different clinical practice requires additional assumptions.

Regional differences between North America and Europe have been described before for other cardiovascular diseases. For example, in heart failure patients, major differences were observed in discharge strategies with shorter length of stay in North America.[8 9] Transatlantic variation has to some extent been outlined for transcatheter aortic valve replacement patients[10]; however, literature on differences in perioperative care or outcomes for SAVR patients is still lacking.

In the PERIGON Pivotal Trial, European patients were older and had higher STS risk of mortality, more comorbidities (including left ventricular hypertrophy) and worse degree of AS. While these parameters relate to each other, European clinicians seem more conservative in their decision for intervention, which could very well explain the differences in valve anatomy and indication between the regions. Minimally invasive approaches were noticeably more popular in Europe, especially in Germany and in the UK, with national preferences in technique of choice. Those countries might be frontrunners, as in North America, a trend for increased minimally invasive surgical AVR has also been observed.[11]

Concerning the antithrombotic regimen, the 2020 American College of Cardiology/American Heart Association guidelines for the management of valvular heart disease[1] make a weak recommendation (class 2a, level of evidence B-NR) for aspirin only for all bioprosthetic SAVR patients in the absence of other indications for OACs and anticoagulation with a vitamin K antagonist for 3–6 months in case bleeding risk is low. The 2021 European Society of Cardiology/European Association for Cardio-Thoracic Surgery guidelines[2] declare a 2a recommendation for low-dose aspirin or OAC and constrict the use to the first 3 months. Despite these largely similar recommendations and comparable frequencies of atrial fibrillation and left atrial appendage closure, the antithrombotic regimens varied widely, even within continents. A potential explanation for this variation could be that each centre acts according to its local protocol as

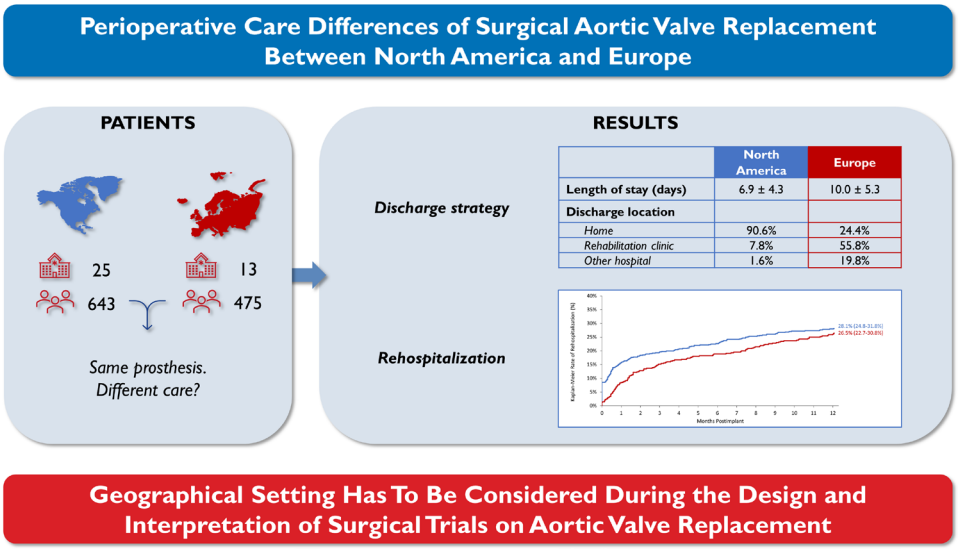

Figure 3 Graphical summary of 'Perioperative Care Differences of Surgical Aortic Valve Replacement between North America and Europe'.

the strength of the evidence is relatively low. A meta-analysis[12] found that the bleeding risk after AVR is affected by the choice of anticoagulation. Hence, regional antithrombotic strategies need to be considered when interpreting thrombosis-related and bleeding-related outcomes if adjustment for medication is lacking.

In addition, discharge strategies were very different between continents and countries. Regional insurance policies could play a role in explaining these differences. As a consequence, length of stay, the risk of in-hospital complications and early rehospitalisation, which is, for example, used as component of the primary composite outcome in the PARTNER 3 trial,[3] could be affected. Furthermore, rehospitalisation has also been integrated into the Valve Academic Research Consortium 3 definitions of primary endpoints in aortic valve research.[13] It should be realised that this outcome is extremely variable. Any comparison of the above-mentioned outcome measures between certain treatments could only be reliably interpreted when considering geographical settings.

In this study, there seemed to be an association between the length of stay, the discharge location and 30-day rehospitalisation after SAVR. However, the descriptive design does not allow for causal inferences, and further studies specifically designed to study these relations are of interest to determine the pros and cons of certain discharge strategies.

Limitations

The population of the PERIGON Pivotal Trial is selective due to its eligibility criteria and might therefore be less representative of the entire SAVR population on each continent. However, the permittance of common concomitant procedures like CABG and the multicentre international character of the study enhance generalisability. Of note, only few patients were enrolled in Italy and Switzerland, so the results from these countries are more prone to sampling variability and therefore are less reliable. These small numbers may not represent the wider practice in these countries. Within countries, there could also be differences between centres, which were not investigated in this analysis, so centre-specific perioperative care and outcomes might not be generalisable to the entire country. In the entire cohort, baseline characteristics will have influenced procedural characteristics and will, in turn, have affected discharge results and antithrombotic regimen. As there were multiple differences in patient and procedural characteristics between continents and between countries, and these are likely accompanied by differences in unmeasured variables, we decided to avoid direct comparisons of clinical outcomes. Hence, although outcomes like mortality, bleeding and rehospitalisation differed per region, no causal inference on the impact of regional perioperative care can be made. Due to our approach of thoroughly comparing continents and countries, multiple statistical tests were executed. As a result, the rate of false-positive findings could be increased. However, since the aim of this study was descriptive rather than confirmative, we choose not to apply correction for multiple testing. All patients received the same prosthesis, so any bias related to prosthetic valve differences are ruled out. Furthermore, the prospective design of the trial and the presence of an independent clinical events committee enabled robust and accurate data gathering despite widely varying geographical settings. These were major advantages that fitted neatly to the study goal.

CONCLUSION

Current perioperative management of SAVR patients broadly varies between North America and Europe. In a large observational trial, there were major differences in patient selection, procedural techniques, antithrombotic regimen and discharge strategy. Specifically, the rehospitalisation risks differed largely between continents and countries. Hence, these findings stress that geographical setting must be considered during the design and interpretation of surgical trials of aortic valve replacement and in the development of (inter)national guidelines (figure 3).

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Contributors BJJV: conceptualisation; methodology; formal analysis; investigation; and writing – original draft; visualisation; guarantor. MDV: conceptualisation; methodology; writing – review and editing; and supervision. RAFDLVW: conceptualisation; resources; and writing – review and editing. VR: resources; writing and review and editing. MJR: resources and writing – review and editing. MS: resources; writing – review and editing. MWAC: resources; writing – review and editing. JFS: resources; writing – review and editing. FL: formal analysis; writing – review and editing; and visualisation. RJMK: conceptualisation; resources; writing and review and editing; supervision.

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