ORIGINAL ARTICLE

VALVE SURGERY

• *results of the brazilian public health system* •

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Abstract

Purpose: Description of hospitalization, mortality rates and cost of heart valve surgery performed by Brazilian Public Health System from 2008 to 2013. Methods: A cross-sectional, observational descriptive study about the procedures of valve surgeries performed in Brazil, from January 2008 to December 2013, by region and federative unit. The study was conducted using the electronic database of Health System Information (Datasus). Results: In the period of study, the total authorizations for hospital admissions for heart valve surgery in Brazil was 65,138 with an average of 10,586 per year. The Southeast region had the highest number of admission and the North the least. The Southeast region concentrated about 45% of valve surgeries in the last six years, while the North was responsible for only 3.80%. The number of heart valve surgeries in Brazil was 5.8/100,000 inhabitants. The national mortality rate during this procedure was 8.8%. The average cost in dollars applied for each valve surgery in 2012 was U$5,947 per 100,000 inhabitants and about $65,757,845 were spent in hospitalization in 2013. Conclusions: The study showed that Brazil spends a high investment in the surgical treatment of valvular heart disease. It is necessary to reinforce the institution of public health programs aimed to rheumatic heart disease in our country to change that reality.

Keywords: Heart Valve Disease; Cardiac Surgical Procedures; Thoracic Surgery.

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INTRODUCTION

Valvular heart disease represents a large number of hospital admissions for cardiovascular disease in Brazil. In developed countries, the decline in rheumatic valve disease (RVD) places the degenerative disease as the most important of the valve disease etiology.[1] However, unlike what happens in these countries, in Brazil about 70% of cases of valvular disease are caused by rheumatic fever.[2] It is estimated that 30% of cardiac surgeries in our country are associated to secondary damage from RVD.[3] Most of the articles published internationally are about patients with other causes of valvular damage than rheumatic fever.[2,4]

Moreover, unlike what happens in other cardiovascular diseases, there are few multicenter studies with large samples on the therapy and diagnosis of valve heart disease with solid conclusions.[2] According to data from SIH/DATASUS, only in 2013, approximately 9,000 people were admitted to SUS hospitals (Brazilian Public Health System) due to chronic rheumatic heart disease (CRHD) across the country. In addition to this epidemiological significance, the disease in question generates significant costs to the SUS that could be avoided with simple measures of prophylaxis. In 2013, still according to the SIH/DATASUS, about R$ 100.000.000 (equivalent to U$ 44.786.816) were spent in hospitalization of patients affected by CRHD.[5] Considering that many patients with this condition had severe valve disease, and would undergo surgical therapy, it is possible to conclude that this kind of treatment represents a significant share in expenses related to this disease.

In this context, it is noted that interventional measures are an important treatment capable of preventing the natural history of valve disease, and this usually happens through repair or valve replacement surgery. In cases where it is not possible to preserve the natural valve apparatus (valvuloplasty), a valve replacement surgery is required.[2] Worldwide, it is estimated that approximately 275,000 valve replacement surgeries are performed each year and the operative mortality rate hovers around 1-15%, thus reflecting a high impact on the course of valvopatias.[6,7] On the other hand, the improvement of valve surgery increasing patient survival, and those are surviving long enough to require replacement prosthesis.[8]

In Brazil, only in 2013, 11,024 procedures for exchange and/or valve repair financed by SUS were performed and the number of surgeries and the results of these in each Brazilian region are different. Therefore it is important to make a temporal and quantitative evaluation of resources used in performing valve surgeries (VS) in the SUS, as well as a comparison regarding the results achieved by each macro-region of the country.

METHODS

A cross-sectional, observational descriptive study was made about the procedures of valve surgeries (CV) realized in Brazil, from January 2008 to December 2013. The study was conducted using the electronic database of SIH / Datasus. The data were obtained from the item health information platform (TABNET), the health care item, subitem hospital procedures by place of detention, which were selected by region and federative unit, the number and average value of authorizations for hospital admissions (AIH), the rates of mortality and the mean duration of hospitalization (MDH) of the five Brazilian regions (North, Northeast, Southeast, South and Center-west).

It was excluded valve surgeries performed concomitantly with other procedures (CABG – coronary artery by-pass graft, for example), and percutaneous valve procedures, from these criteria, eight procedures with their respective codes were selected (Table 1). The results were analyzed in Microsoft Excel and subsequently compared with the existing literature.

Table 1. Codes for heart valve surgery

Codes	Procedures	Prevalence
0406010021	Opening valvar aortic stenosis	0.14%
0406010030	Opening pulmonary valve stenosis	0.35%
0406010340	Correction of tricuspid insufficiency	0.38%
040601552	Implant/exchange of surgical valve position (Ross procedure)	0.17%
0406010692	Implant Prosthetic valve	66.87%
0406010781	Plastic/exchange of tricuspid valve (Ebstein's Anomaly)	0.13%
0406010803	Plastic valve	6.09%
0406010820	Plastic valvar and/or multiple valve replacement	25.87%

Source: INFORMATION SYSTEMS IN HEALTH DATASUS.

RESULTS

Table 2 shows the total number of authorizations for hospitalization (AIH) by geographic region and total period between 2008 and 2013. During the study period it was found in the country an increase of 4.38% in the number of AIH between the period 2008 and 2013. The total number of valve surgeries, the Southeast region concentrated approximately 45% in the last six years, while Northern region accounted for only 3.8% of the total. Regarding the Brazilian macro regions, we noticed a slight increase in most of them, except the South, where there was a reduction of 9.25% in the number of AIH. Among the regions, stand out from the Midwest and Southeast, with the largest (22.03%) and the lowest (0.5%) increase respectively. There were approximately 5.8 valve surgeries per 100,000 people in Brazil according to number of AIH to population ratio (using the estimated resident population by SIH/DATASUS region in 2012). As for regional distribution, there is in descending order, 8.24/100,000 in the South, 6.72/100,000 in the Midwest, 6.07/100,000 in the Southeast, 4.8/100,000 in the Northeast and 2.85/100,000 in the North.

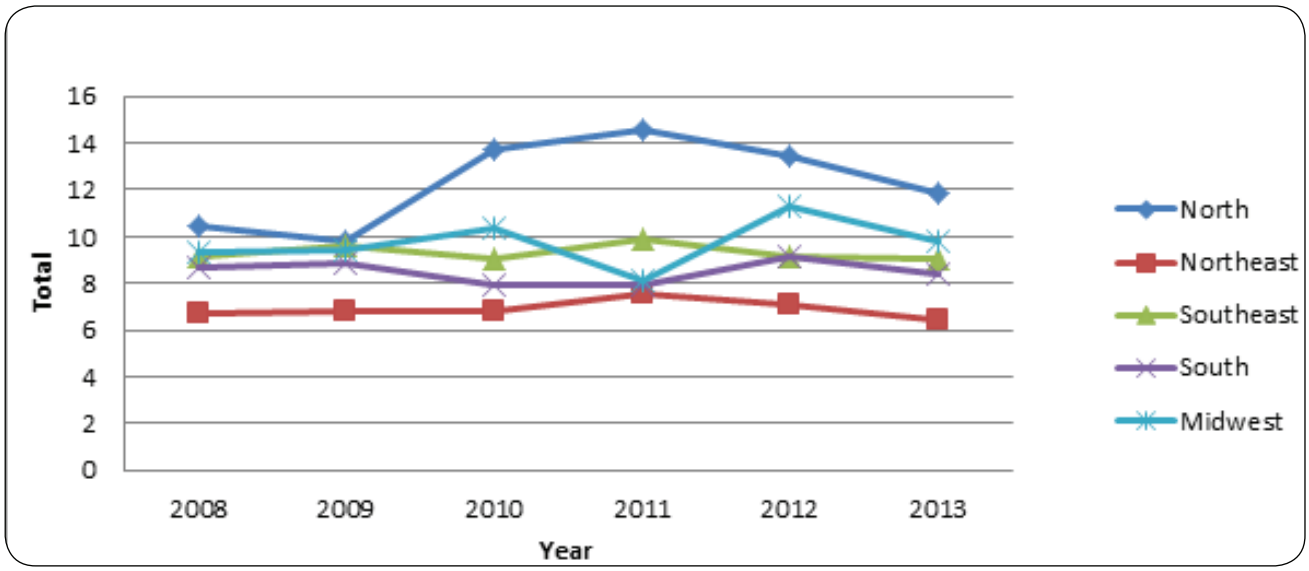
Table 2. Admissions for heart valve surgery by Geographic Region of Brazil from 2008 to 2013

Regions of Brazil	2008	2009	2010	2011	2012	2013	Total
Northern Region	389	428	346	401	467	446	**2.477**
Northeast Region	2,096	2,320	2,026	2,321	2,592	2,548	**13,903**
Southeast Region	4,728	4,877	4,938	4,844	4,952	4,752	**29,130**
Southern Region	2,581	2,370	2,325	2,400	2,286	2,342	**14,304**
Midwest Region	767	834	765	1052	970	936	**5.324**
Total	10,561	10,829	10,400	11,057	11,267	11,024	**65,138**

Source: INFORMATION SYSTEMS IN HEALTH DATASUS.

The Figure 1 shows the variation in mortality rate (MR) occurred in every region of the country in the period studied. It was observed that there was a peak in 2011 in the North. Comparing the years 2008 and 2013, it was observed that in most regions there was a slight reduction in MR (Figure 1), with the exception of the North and Midwest that showed an increase of 12.71% and 3.25%, respectively regions.

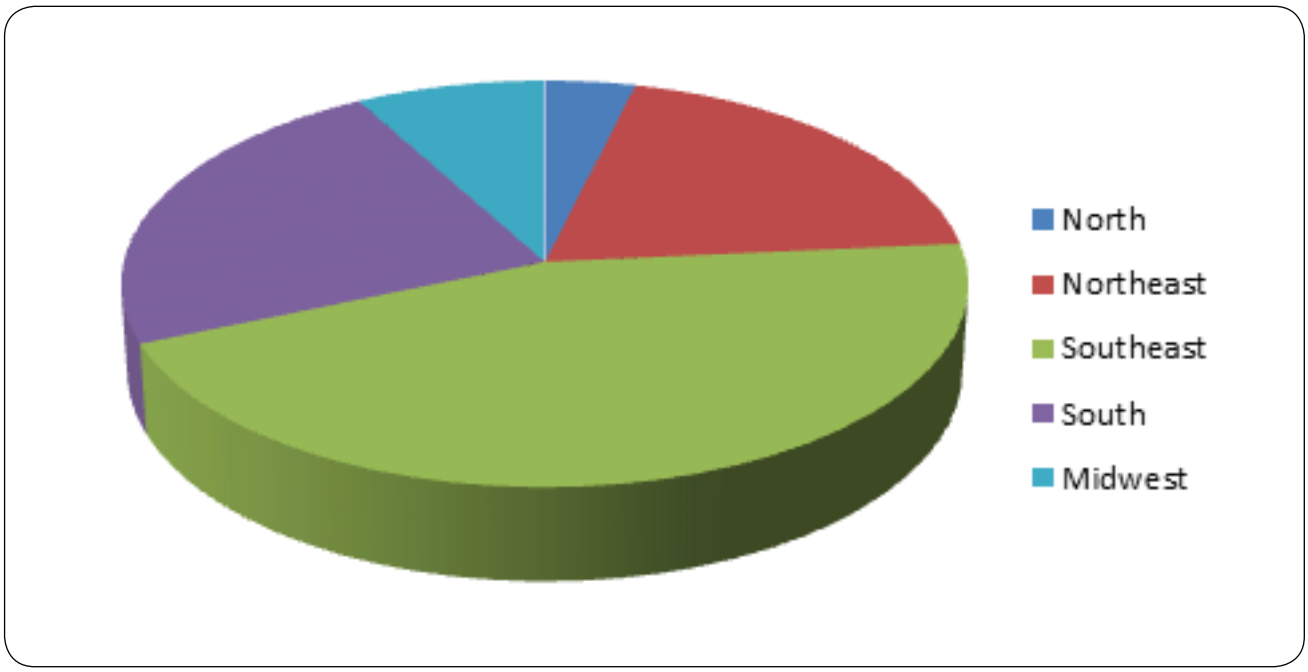
Figure 1. Total mortality rate heart valve surgery by region and year



Source: INFORMATION SYSTEMS IN HEALTH DATASUS.

Figure 2 shows the percentage of financial resources that was spent in heart valve surgery by Brazilian Regions from 2008 to 2013.

Figure 2. Percentage of heart valve surgery cost per geographic region of Brazil in the period 2008-2013



Source: INFORMATION SYSTEMS IN HEALTH DATASUS

Table 3 Shows the total amount spent in dollars, in the six years analyzed, besides the total amount spent in dollars per year.

Table 3. Total cost in dollars, employed in valve surgery by geographic region of Brazil 2008-2013

Regions of Brazil	2008	2009	2010	2011	2012	2013
Northeast	$ 1,801,858	$ 2,165,980	$ 1,772,268	$ 2,400,693	$ 2,825,723	$ 2,655,419
Northeast	$ 8,757,591	$ 10,455,449	$ 10,445,449	$ 12,542,511	$ 14,309,912	$ 14,268,714
Southeast	$ 21,480,425	$ 24,207,176	$ 25,714,700	$ 29,594,514	$ 29,996,356	$ 28,851,349
South	$ 13,175,721	$ 12,640,032	$ 12,920,980	$ 15,028,266	$ 14,657,552	$ 14,589,191
Midwest	$ 3,349,016	$ 3,942,449	$ 3,963,904	$ 6,154,835	$ 5,688,942	$ 5,393,170
Total	$ 48,564,613	$ 53,411,088	$ 53,888,635	$ 65,720,821	$ 77,311,603	$ 65,757,845

Source: INFORMATION SYSTEMS IN HEALTH DATASUS.

Table 4 shows the average cost for each AIH and average value spent in valve surgery per 100,000 inhabitants by geographic region of Brazil in 2012.

Table 4. The average cost in dollars, for each AIH and average value spent per 100,000 inhabitants applied to valve surgery by geographic region of Brazil in 2012

Regions of Brazil	The average cost for each AIH in 2012	Average value spent per 100,000 inhabitants in 2012
North	$ 6,050	$ 17,285
Northeast	$ 5,520	$ 26,545
Southeast	$ 6,057	$ 36,775
South	$ 6,338	S 52,253
Midwest	$ 5,864	$ 39,440
Total	$ 5,974	$ 34,700

Source: INFORMATION SYSTEMS IN HEALTH DATASUS.

DISCUSSION

The increasing age of the world population, coupled with the lack of adequate prophylaxis of rheumatic fever in developing countries is increasing the incidence and prevalence of valve disease worldwide.[9]

The number of valve surgeries per 100,000 inhabitants varies in different regions of the world. India performs approximately 1.8 surgeries/100,000, while Brazil has 5.8/100,000 and Netherlands has 28/100,000. We can suppose

that developing countries like Brazil and India have a smaller number of surgeries per 100,000 inhabitants because their limited health resources. Thus, not all patients with valve heart disease have access to appropriate treatment.[9]

The same occur in Brazil regions, those with less favored socioeconomic indicators have smaller number of surgeries per 100,000 inhabitants and higher mortality rate. In the South, for example, where the social indicators are better, the number of procedures per 100,000 habitants is almost three times than that observed in the North, which has the worst socioeconomic indicator in Brazil. In addition, the mortality rate in the South is smaller than the North.

The southeast region is responsible for almost half of the valve surgeries performed in the country, in relation to total absolute numbers of AIH, however in terms of surgeries per 100,000 inhabitants the southeast region ranks third, losing to the South and Midwest.

Regarding the mortality rate, it is noted that the overall value in the country was 8.8%. Studies showed great variability in mortality associated with valve surgery in the world, with values between 1-15%.[6,7]

Some of the limitations in this study are that the mortality is strongly associated with severity of the valvular disease, the number of associated procedures, type of the valvar disease, techniques employed and specific population characteristics, such as socio-economic status and educational level. It is important to highlight that there are few national studies that show the Brazilian situation and further the reality of the procedures performed in the SUS, when discussing valve surgery and valve disease.[2]

Evaluating the costs of the procedures, it was also observed a variation among regions of the country. The Southeast region spends almost twice in absolute values than the South region, but the South region invests 70% more per 100,000 inhabitants than the Southeast.

The study showed that Brazil invests a high value in the surgical treatment of valve heart disease, probably much of them resulting from rheumatic disease.[2] Rheumatic fever in turn, is a pathology of easy and low-cost treatment, since the *Streptococcus pyogenes* group A Lancefield is sensible to penicillin, a common antibiotic in our country.[10,11,12] The treatment becomes more invasive and more costly if the rheumatic fever prophylaxis is neglected, because the patients might develop more severe forms of valvular disease. About 95% of the spent on rheumatic heart disease in developing countries is on surgical procedures whereas almost nothing is spent on prophylaxis that is extremely effective. Therefore, there must be a balance between the prophylaxis and palliative treatment.[9] It is necessary to reinforce the institution of public health programs aimed to rheumatic heart disease in our country to change this reality.

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