

Regionalization of Brazilian pediatric cardiovascular surgery

Regionalização da cirurgia cardiovascular pediátrica brasileira

Valdester Cavalcante Pinto Júnior¹, Maria de Nazaré de Oliveira Fraga², Sílvia Maria de Freitas³, Ulisses Alexandre Croti⁴

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INTRODUCTION

The National Policy of High Complexity Cardiovascular Care published in 2004 in Ordinance nº 210, Annex IV, sets parameters of distribution Services for High- Complexity Pediatric Cardiovascular Surgery, signaling for a network of care to patients with congenital heart disease [1]. Such an attitude aimed to distribute specialized services in pediatric cardiovascular surgery nationwide, using the population criteria as the calculation basis.

Congenital heart disease has an impact on perinatal mortality, accounting in Brazil in 2007 for 6% of infant deaths under 1

year old [2]. In another study in 2010 in the state of São Paulo, for the same age group, a 8.5% mortality rate was reported [3].

Even with the implementation of regulations and investments, deficits of surgical procedures remain high. In 2002, the deficit in Brazil was 65% [4] and in 2008, 62% [2]. In the state of São Paulo, in 2010, 50% of children under 1 year old were without surgical treatment [3].

In 2009, Pinto Jr et al. [5] concluded that the non-observation by the Ministry of Health, regional differences in publishing standard rules for all and an inadequate remuneration per procedure should hinder the expansion in the care.

1. Cardiovascular Surgery Specialist, Master in Public Policy Evaluation at the Federal University of Ceará (UFC), Chief of Pediatric Cardiovascular Surgery at Hospital Messejana, Fortaleza, CE, Brazil.
2. PhD in Nursing, Federal University of Ceará, faculty member of the Professional Master's Course in Public Policy Evaluation at UFC, Fortaleza, Ceará, Brazil.
3. Professor of Professional Masters in Public Policy Evaluation at UFC, Fortaleza, Ceará, Brazil.
4. Tenured Professor, Head of the Department of Pediatric Cardiovascular Surgery, São José do Rio Preto – Hospital de Base - FUNFARME / FAMERP, São José do Rio Preto, São Paulo, Brazil.

Correspondence address:

Federal University of Ceará / Heart Institute for Children and Teenagers
Av University, 2853 - Benfica - Fortaleza, Ceará, Brazil – Zip code: 60020-181
E-mail: contatoicca@yahoo.com.br

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Abbreviations, acronyms and symbols	
CHD	Congenital heart disease
USA	United States of America
IBGE	Brazilian Institute of Geography and Statistics
SAS	Health Care Secretariat (acronym in Portuguese)
UACAC	High Complexity Assistance Unit in Cardiology (acronym in Portuguese)
HU	Hospital Unit

The theme regionalization, premise of public health policies, has been studied by the surgeons, although it interferes with patient access to treatment, with an impact on early and late results.

This article contributes to enlarge the bibliographic collection, by revealing the national scene as the distribution of pediatric cardiac surgery centers in the light of speeches and concepts of regionalization.

CONCEPTS OF REGIONALISATION

Regionalization is a scheme of rational deployment of health resources, organized in a hierarchical arrangement, which is the maximum possible care in the primary centers, while other services are being appropriately used according to the patient's individual needs [6].

According to Somers & Somers [7], regionalization is a formal system of resource allocation with appropriate geographical distribution of health facilities, human resources and programs, so that the different professional activities cover the entire spectrum of comprehensive, primary, secondary, tertiary and long stay care, with all agreements, connections and referral mechanisms required to integrate various levels and institutions in a coherent and efficient way to assist all the patients' needs in a defined base population.

The basic principle of regionalization is that levels of care should be offered as much as possible, by the lowest level of the system. For that, it is necessary to balance the desires and needs of the public to have health services close to their homes, as well as more prestigious and complex centralized facilities. Regionalization requires the allocation of health resources in a particular area, in an order that facilitates the access, offering high quality services, low cost, equity, with a better and faster response to the consumers' needs and desires [8].

Regionalization is also referred to in private services in the United States of America (USA). The private health system are organized by the market. This distribution can be prioritized according to the company size, the smallest being located in the states and the biggest ones in the large urban centers. This spatial distribution of private services is called "central place theory" and is driven by three factors: the volume of demand

for each of the units, economy of scale in production and transportation costs [9].

The regionalization strategy proposes to find a balance between excessive structural centralization and complete decentralization of health services. For some sectors, this approach, the distance traveled between the housing and the primary centers should not exceed more than 30 minutes and they should provide coverage to a population ranging between 20,000 and 50,000 inhabitants in urban areas. General hospitals should not be more than two hours from their homes and should provide coverage ranging between 50,000 and 200,000 inhabitants. [9]

Specialized tertiary hospitals with over 400 beds, should cover a population of approximately 1,000,000 inhabitants, in conjunction with universities and with other services from the secondary level. The highest amount of beds of these establishments would be determined by technological complexity and by economies of scale. These units could assist a geographical radius located in a relatively larger temporal distance (3 to 4 hours) [9].

The distance would be the most important criterion to establish the geographical distribution of health institutions within a regionalized system. We have to point out that, in a country with huge distances, huge regional differences, especially between the extremes almost depopulated regions and overpopulated urban centers, we need to think creatively and context parameters through viable adaptations which can bring positive impacts on the problematic situation. The great criterion is the access [8].

An interrelation with other principle is necessary to make the regionalization effective, hierarchization based on the fact that it is possible to effectively solve certain health problems with production functions of different complexities and therefore with different social costs classified by level of care. The levels of care are different "appropriate technologies" as to the effectiveness, social cost and feasibility of health problems of various complexities, classified into primary, secondary and tertiary. Consequently, the hierarchization is determined by ensuring solution according to the technological complexity required at each level and the system level as a whole [8].

Regionalization could meet several criteria: homogeneous region; polarized region; regional planning. In the first case, it would be based on the possibility of territorial aggregation with uniform characteristics, arbitrarily specified. In the second case, it would correspond to a geographical area influenced by a economic development pole, represented by a company, industrial agglomeration, prominent tertiary activity or an urban center. This area may have a regionalized format, in so far as that around the most developed pole may be distributed more prominent smaller sites of production and distribution, aiming at the economic transportation and economies of scale and adjustments to the demand. The area would correspond to a space articulated by flow productions and commerce. In

the case of the planning area, this derives from the application of political-administrative criteria inserted in the planning activity. We define a region based on the intentionality of political authority, which claims an understanding of territory based on the implementation requirements of certain public services, in the exercise of the regulatory power of the state or, for example, the focus of public sector policies on a particular part of the territory [10].

In the case of health care, regionalization obeys to the criterion of planning of a service provision, the need to rationalize the dynamics of articulation, establishing greater coordination and achieving results in terms of increased access and equity. The first two criteria may also be considered in a more subordinate way [8].

Regionalization of care in pediatric cardiology and collaboration among regional centers can not only improve results by focusing the experience, but also facilitates the quality evaluation due to the increased surgical volume [11].

Another aspect that must be emphasized is the need to take into account and deepen the analysis of the public-private mix, aimed at understanding what is possible and beneficial to establish a relationship of real complementarity, which includes a supplementary health care, filling an empty spaces of complexity of the public sector by the private one and vice versa [8].

These agreements represent extra resources for university hospitals that would help compensate for the reduced values of federal resource transfers and contribute to improving their autonomy management. To avoid a loss to the care of SUS patients, it is assumed that hospital capacity and bed allocation should be expanded [12].

Some hospitals adopt new methods of management, called “partnerships”. Modalities that propose change in the public-private sector relationships in the production of health services, through, for example, the provision of state hospital beds to the market, which is conventionally called “cross-subsidy”: the connection between the state health system (public and free) and the supplementary system (private and paid) [13].

Regionalization of Pediatric Cardiovascular Surgery

The data analyzed in this article were obtained from DATASUS, the Department of Health Care (SAS) / MS and the Brazilian Institute of Geography and Statistics (IBGE).

Some secondary data collected from the Ministry of Health-DATASUS are public domain and were obtained via the Internet, such as those related to quantitative hospitalizations. Other groups of information are not available on the internet and are composed of number of adults and pediatrics cardiovascular surgery, spread across states and regions, frequency of procedures and investment in pediatric cardiovascular surgery, distributed according to region, federative unit, institutions and age groups. For such data to be released, a specific request was made, and the Department

of Health Care (SAS) of the Ministry of Health provided DATASUS / Ministry of Health.

IBGE data were basically obtained by the acquisition of publications and also by accessing its website.

Currently, there are 240 health facilities qualified for high-complexity cardiovascular care (UACAC). Among them, 199 are qualified as assistance units and 41 as reference centers. There are 140 hospitals qualified to perform cardiovascular surgeries only in adult patients, eight qualified exclusively for pediatric cardiovascular surgery and 58 to perform adult and pediatric surgeries, 166 for vascular surgery, 201 for interventional cardiology, 58 for extracardiac endovascular procedures and 54 for electrophysiology, as listed in Table 1.

For the geographical distribution of Support Services for Highly Complex Pediatric Cardiovascular Surgery, Ordinance nº 210 (Annex IV) builds a proportion of 1:800.000 inhabitants. These parameters were applied to the estimated population in 2009 (IBGE) of the federated units and Brazilian regions, the correlation between the registration goal and quantitative services were effectively made. Thus, we elaborated Table 2 that shows that the country and specialty deal with deficits, and a total absence of services in some territories. So now we can say that the principle of regionalization has not been accomplished in the implementation of the policy. This fact can be explained by various causes, such as the regional differences, the lack of qualified professionals and hospitals with good infrastructure for the complex procedures.

Regionalization: An Analysis of the Frequency of Procedures

The health service units qualified to perform procedures in congenital heart disease can be classified according to age of patients they assist. Eight units perform procedures on patients under 18, 58 in both adults and children and 140 units are for people over 12 years old.

Table 1. Distribution of High Complexity Assistance Unit in Cardiology (UACAC).

Qualification Types	Total
Qualified at the High Complexity Assistance Unit in Cardiology	240
Assistance Care Unit	199
Reference Center	41
Total number of establishments performing Cardiovascular Surgery	206
Qualified for Adult Cardiovascular Surgery	140
Qualified for Adult and Pediatric Cardiovascular Surgery	58
Qualified for Pediatric Cardiovascular Surgery	8

Source: SAS/MS, 2010

Table 2. Distribution of Units (HU) in pediatric cardiovascular surgery (CS) in regions and states of the Federation in 2009*.

Region	Population	Aim 1:800.000	CS (adult and child)	CS pediatric	Total	Deficit (%)
BRAZIL	191,480,630	239	58	8	66	72.43
North	15,359,608	19	2	0	2	89.58
Rondônia	1,503,928	2				100.00
Acre	691,132	1				100.00
Amazonas	3,393,369	4				100.00
Roraima	421,499	1				100.00
Pará	7,431,020	9	2		2	78.49
Amapá	626,609	1				100.00
Tocantins	1,292,051	2				100.00
Northeast	53,591,197	67	19	3	22	67.16
Alagoas	3,156,108	4	1		1	74.36
Bahia	14,637,364	18	7		7	61.75
Ceará	8,547,809	11	1	2	3	71.96
Maranhão	6,367,138	8	2		2	75.00
Paraíba	3,769,977	5	1		1	78.72
Piauí	3,145,325	4	2		2	48.72
Pernambuco	8,810,256	11	3		3	72.73
RN	3,137,541	4	1		1	74.36
Sergipe	2,019,679	3	1		2	20.00
Southeast	80,915,332	101	23	1	23	77.25
Espírito Santo	3,487,199	4	1	0	1	77.27
Minas Gerais	20,033,665	25	6		6	76.00
Rio de Janeiro	16,010,429	20	4		4	80.00
São Paulo	41,384,039	52	12		12	76.79
South	27,719,118	35	11	3	14	59.54
Paraná	10,686,247	13	5	2	7	47.76
Santa Catarina	6,118,743	8		1	1	86.84
RGS	10,914,128	14	6		6	55.88
Midwest	13,895,375	17	3	2	5	71.26
Distrito Federal	2,606,885	3	2		2	39.39
MGS	2,360,498	3	1		1	66.67
Mato Grosso	3,001,692	4		1	1	73.68
Goiás	5,926,300	7		1	1	86.49

Source: SAS/MS 2010

*Estimated population: IBGE

The age groups studied were: between 0-29 days, and one month to 11-year-old patients.

It is worth noting that the twenty largest institutions by the volume of surgeries in 2008, are qualified as units of pediatric cardiovascular surgery or associated with adult cardiovascular surgery.

Taking into consideration the care of all age groups, the distribution of the twenty largest institutions by region was: six (30%) units in the Northeast, three (15%) in the Midwest, seven (35%) in Southeast, four (20%) in the South and none in the North.

With over 200 procedures performed in 2008, seven (35%) units were found, two in the South, one in the Midwest and four in the Southeast. Between 100 and 200 procedures performed in the same year, there are 12 (60%) units, five, three, two two, respectively, in the Northeast, Southeast, Midwest and in the South. Less than 100 procedures performed that year there is just a unit (5%) in the Northeast region (Figure 1).

The frequency of procedures in the 185 institutions that had production ranged from one to 536, with an average corresponding to 36.2 ± 69.5 . It is noteworthy that 108 institutions performed less than 12 procedures in 2008. Since

the frequency of procedures of the 20 largest institutions varied from 95 to 536, with an average corresponding to 200 ± 107 .

When the 20 largest institutions that assist the age of one month to less than a year were stratified, we could find a geographic distribution: one (5%) unit in the North, five (25%) units in the Northeast, three (15%) units in the Midwest, six (30%) in the Southeast and five (25%) in the South. For the same age group, considering over 100 procedures performed per year, two (10%) units were identified, one in the South and one in the Southeast. Between 50 and 100 procedures performed per year, there are six units (30%), one in the Northeast, three in the Southeast, one in the Midwest and South. Under 50 procedures performed per year, there are 12

units (60%), one in the North, four in the Northeast, two in the Southeast, two in the Midwest and three in the South (Figure 2). Therefore, the major hospitals assisting children from one month to less than one year are relatively well distributed in all geographic regions, with the exception of the northern region, which has the lowest percentage among them (5%).

Compared to the same age group in the 66 institutions that had production, this ranged from one to 114 procedures per year, with an average of 21.2 ± 27.2 , and 38 institutions that had less than 12 procedures per year. In the 20 largest institutions, production ranged from 26 to 114 procedures per year, with an average of 55 ± 27 .

For the surgical treatment of neonates, in other words, children between zero and 29 days, the location of the 20 largest institutions is as follows: two units in the Northeast (10%), three in the Midwest (15%), nine in Southeast (45%) and six in the South (30%). Regarding the volume of procedures performed, the distribution found was: only one unit in the South performing over 50 procedures per year; seven units, one in the Midwest, four in the South and two in the Northeast between 20 and 50 procedures per year; 12 units, two in the Northeast, five in Southeast, two in the Midwest and three in the south presented less than 20 procedures per year, (Figure 3). Thus, the major institutions that perform surgical procedures are located between the South and Southeast (75%) and only the small and mid-sized institutions are better geographically distributed, due to the absence of institutions in the North.

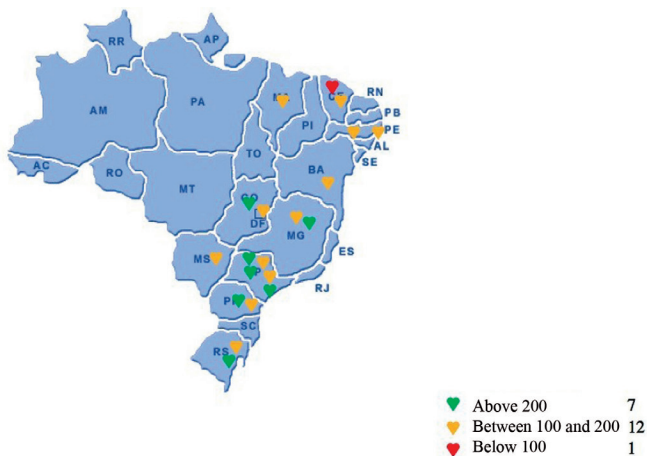


Figure 1 - Distribution of the top 20 hospitals operating patients of all age groups

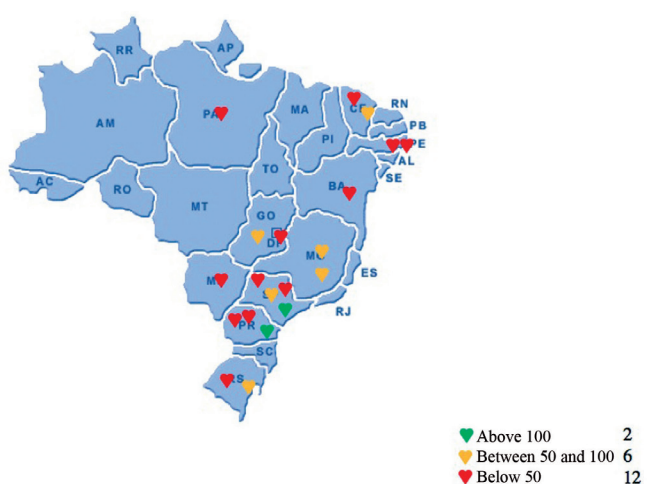


Figure 2 - Distribution of the top 20 hospitals operating patients between 1 month and <1 year

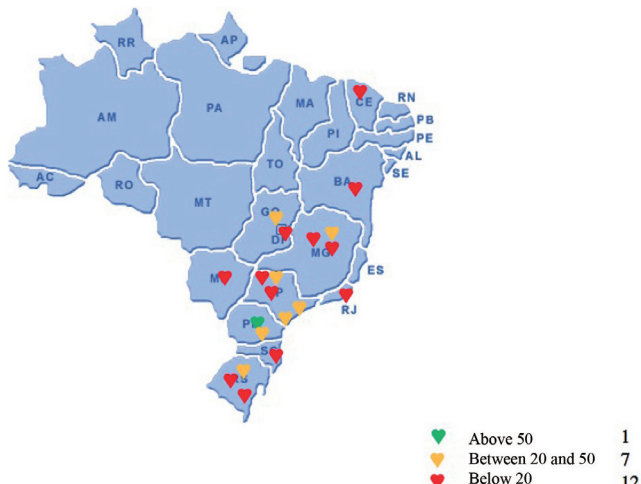


Figure 3 - Distribution of the top 20 hospitals operating patients between 0-29 days

Regarding the surgical procedures in 56 institutions that had production, it ranged from one to 51 procedures per year, with an average of 11 ± 9 , 41 institutions, we also found 41 institutions that performed less than 12 procedures per year. The frequency of procedures of the 20 largest institutions ranged from seven to 51, with an average of 20.6 ± 11.7 .

Therefore, there is a densification of the largest qualified centers for the treatment of patients with congenital heart disease in the South and Southeast, and to a lesser extent in the Midwest and Northeast, with the exception of the treatment for patients suffering from one month to one year old in the Northern region, excluded from the map of the largest institutions in Brazil. When the Public Power expects society interventions, they are transferring their responsibility to others which is to promote health. The Public sector should have a different look for minorities, where the congenital and acquired heart disease of the pediatric group are, establishing sufficient resources to meet the specific demands.

“Using only criteria of cost-effectiveness can result in discrimination against the minority groups, such as disabled people and those with diseases whose expression is smaller in a given population” [14].

Managers of the Ministry of Health, in a study [2], did not defend a specific number of centers for pediatric cardiovascular care in the country, but the concentration of procedures in a smaller number of centers as an option to provide better results.

“The high complexity procedures has a different regionalization because they are more centralized. [...] Sometimes, reference is made to various macroregions, and even to states” (EG1). “The structure of pediatric cardiac surgery is so heavy that some concentration is not harmful. From the general point of view, I prefer fewer centers performing more surgeries, a more efficient structure than many centers [...] You do not need around two hundred centers in the country, it is better to have fewer and more effective ones well-distributed in the country. [...] I do not have this magic number here” (EG2).

The speeches indicate convenience to rethink their own regionalization and parameters proposed in isolation and their associations with others seems more appropriate. They also show that the Public Power can not abdicate its role as articulator and the greatest responsible for the regulation of what they defined in their policy.

In the same study [2], the medical society directors that put the specialty into question, were asked about the ideal type of services that would assist patients with congenital heart diseases.

“The pediatric hospital that takes care of congenital heart disease will have much trouble trying to give assistance to patients with congenital heart diseases that exceeded the pediatric, adult and young adults age, and this is a population that is significantly increasing [...]. So, it seems much more logical to me an institution assisting the cardiac patients with

congenital heart disease at any age, as most model centers. It is more difficult for you to equip a pediatric institution with a structure for adult care, than equip an cardiology institution with a structure for child care” (CC2).

“Maybe one or two large institutions in the country focused on the treatment of congenital heart disease could be replicating knowledge and technology in this area, which would be important. In a country with continental dimensions, it would be very difficult to have specific hospitals in each area [...]. Under certain conditions there can be important reference centers for the treatment of certain complex congenital heart disease such as hypoplastic left heart syndrome. So if we want better results, maybe the concentration of cases in centers that have maximum and better conditions to work with this kind of child [...] is the idea” (CC4). “Once the patient has congenital heart defect, even if operated, the individual will need to be monitored and, depending on the disease, the patient will also need other surgical procedures throughout life. Thus, the ideal would be an institution in which there was communication between pediatricians and adult physicians, with continuity of care with no interruptions and it may happen if there is an agreement between a pediatric and an adult institution” (CCE).

According to these speeches, the people interviewed pointed to the creation of specialized centers where, regardless of age, patients with congenital heart defect would really have the care they need. Some of these centers would also train professionals from various fields, working as knowledge replicators. The representatives of the medical specialty also considered the possibility of maintaining hospitals directed to the treatment of adults or even children's hospitals, since these formalize agreements with hospitals that perform cardiac surgery in children or adults, respectively, and teams that have qualified treatment demanded by patients. This strategy would be a way to leverage the network of health institutions in regions with significant deficits procedures.

These arguments are corroborated by the thought of Oechslein & Hoffmann [15], which recommend suprarregional reference centers with cardiologists trained in congenital heart disease in adults and children, and experienced in their special needs, problems and management of this unique population. They conclude by saying that the close collaboration between pediatric and adult cardiologists is very important, when participating in the care of patients of congenital heart disease,

In short, we identified and mapped by regions, the twenty largest Brazilian hospitals responsible for the treatment of congenital heart defects. Therefore, it is possible to build a regionalized network of care equitably distributed in all regions of Brazil; promoting a Suprarregional Reference Center as a reference in the treatment of complex congenital heart disease, institutions with history of attention to all congenital heart defects in all age groups, and create multi-professional training centers, starting from the Suprarregional Reference

Centers. However, pediatric cardiac care in a continental country, requires intentionality of political authority, which must have an understanding of the territory based on the implementation requirements of certain public services, with public sector policies in certain part of the territory taking the risk of promoting unfair and discriminatory public policies against minority groups.

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