

Evaluation of results of cardiovascular care as a tracer of the comprehensiveness principle¹

Avaliação de resultados da atenção aos agravos cardiovasculares como traçador do princípio de integralidade

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Abstract

This study aims to evaluate the articulation among levels of cardiovascular care in the region of Ribeirão Preto, State of São Paulo, Brazil. It is an evaluative research using secondary data from the Brazilian Ministry of Health. We analyzed all outpatient and hospital procedures related to cardiovascular diseases that were treated in primary and hospital care in 26 municipalities in the period 2000-2010. Time series were used in the analysis and the assumption was regional organization of health systems. The production varies during the period, with an increase in outpatient care and surgical hospitalizations, and a decrease in clinical admissions. There is an uneven supply of services in the municipalities, and the smallest ones concentrate electrocardiograms and clinical admissions. More complex diagnostic tests and surgical admissions are conducted predominantly in the largest city. The evaluation of health services using cardiovascular problems as the tracer condition proved to be adequate, as it showed articulations among levels of care in the regional health system. This allows us to infer that regionalization, in this scenario, favors comprehensive care in its horizontal dimension.

Keywords: Health Evaluation; Health Management; Comprehensive Health Care.

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Resumo

Avaliar a articulação dos níveis de atenção aos agravos cardiovasculares na região de Ribeirão Preto-SP-BR. Pesquisa avaliativa utilizando dados secundários do Ministério da Saúde-BR. Foram analisados todos os procedimentos ambulatoriais e hospitalares relativos aos agravos cardiovasculares, atendidos da atenção básica até hospitalar, em 26 municípios, no período de 2000-2010. Para análise foram utilizadas séries temporais tendo como pressuposto organização regional de sistemas de saúde. A produção varia no período, com incremento na atenção ambulatorial e internações cirúrgicas, diminuição de internações clínicas. Há oferta desigual de serviços nos municípios, os menores concentram eletrocardiogramas e internações clínicas. Exames diagnósticos de maior complexidade e internações cirúrgicas são realizados predominantemente no município-polo. A avaliação de serviços de saúde utilizando agravos cardiovasculares como condição traçadora mostrou-se adequada, evidenciou articulação entre os níveis de atenção no sistema regional de saúde, que permite inferir nesse cenário a regionalização e favorece a integralidade da atenção em sua dimensão horizontal.

Palavras-chave: Avaliação em Saúde; Gestão em Saúde; Assistência Integral à Saúde.

Contextualizing the problem

The Brazilian National Health System (SUS) is a public policy provided in the Federal Constitution of 1988 (Brazil, 1988). The system reorders health actions and services, based on philosophical and organizational principles.

The achievement of principles such as universality, integrality and equality in the access to health care has been hampered because the implementation of regionalization is still precarious, and there is the risk of decentralized systems achieving universality without integrality, i.e., achieving primary health care to every citizen without sufficient and adequate coverage of specialized services (Barata; Tanaka; Mendes, 2004).

Integrality can be analyzed in two dimensions: vertical, which includes the vision of the human being as a single whole, indivisible; and, horizontal, which constitutes itself a set of actions applicable in different fields and levels of attention, from primary to quaternary. It works as a change guiding model for health care, mainly in large urban conglomerates (Carvalho, 2006). This principle can also be analyzed by two other dimensions: macro - the one that includes the set of services offered by public health systems to citizens; and micro - the one that comprises all the coordination between preventive and assistance actions for the understanding and resolution of people's needs (Viegas; Penna, 2013).

The scope for integrality conceptions has its relevance in the operationalization of the SUS and seems to converge to the integrality of health care, considering aspects of supply, organization and coordination of different actors and health care services (Brito-Silva; Bezerra; Tanaka, 2012). This situation refers to the idea of care networks and, in this context, regionalization favors the organization of actions and health services in a region aiming to promote the integrality of care, rationalization of expenditures, optimization of resources and equality - also ensuring the human right to health (Ferreira et al., 2011).

From this point of view, one can justify the use of evaluation in health care as a management instrument with the potential to provide a more objective analysis and subsidize decision-makers to identify more effective alternatives for the articulation of

different levels of the health system.

Tracers are references used in the evaluation of quality and access to a service or health service network. The tracer technique, advocated by Kessner, is based on the idea that through the assessment of the assistance provided for a set of certain pathologies, of which is known the evolution of the health-disease process and with technologies of proven intervention, it is possible to infer the quality of the health care in general, including access to more complex levels of the system. The criteria proposed to select tracers are: high-frequency events, with known evolution and diagnosis, preventive measures and effective and well-defined therapies (Kessner et al., 1992).

For Silva et al. (2010), representative cases of a service profile that allows the analysis of how complex work processes are applied can be considered as tracers. In this sense, we have a relevant reference, considering the complexity of health systems. For Samico et al. (2010), it is possible to adapt the use of this technique for the evaluation of programs and health systems through the selection of markers that may reflect their operation.

An approximation of the evaluation of integrality through the use of a technological complementarity is also an option, i.e., through the access to different levels of the health system to increase diagnosis and treatment capacity. Thus, this study does not have a proper approach for quality assessment, but that aspect can be included in our investigation.

The employment of the Donabedian's structure-process and outcome approach has been improved to be more objective and direct the decision-making processes. To this end, we adopted the proposal of prioritizing the analysis of processes that represent the interaction with the user, allowing the direct connection with all results and, actually, it clearly portrays the use of the existing structure, enhancing the use of tracers in the evaluation of health services systems.

Based on these criteria, we selected as tracers for this study cardiovascular diseases that represent a global problem and require integral assistance.

In the region of the Americas 3,9 million deaths are reported annually - 75% caused by cardiovascular diseases. In the United States, one in five people has

a non-transmissible chronic condition, including cardiovascular diseases. By 2030, a growth of 42.4% is expected in the American continent, if the number of cases continues to grow at the current ratio (OPAS, 2011). Ischemic heart disease and cerebrovascular accident are the leading causes of mortality worldwide, corresponding, respectively, to 12.9 and 11.4% of the total number of deaths in the world in 2011 (WHO, 2013)

In 2005, in Brazil, the leading causes of death were, firstly, circulatory system diseases; secondly, neoplasms and, thirdly, external causes of death, presenting variations according to age-group, gender and country region (Brazil, 2008).

In Brazil, this group of diseases is responsible for 72% of deaths, and are more prevalent in low-income people, reflecting the negative effects of globalization, rapid urbanization, sedentary lifestyle, high calorie food, and marketing strategies that encourages the use of tobacco and alcohol (Malta, 2014).

Since 2004, the Ministry of Health of Brazil instituted the National Policy of High-complexity Cardiovascular Care. Such policy operates all over the national territory, with the organization and implementation of Regional Cardiac Care Networks to offer adequate technical conditions, physical facilities, equipment and human resources to the provision of specialized and humanized assistance to the ones who suffer from cardiovascular pathologies, as well as to develop a strong articulation and integration with local and regional health care systems (Brazil, 2004).

The magnitude of cardiovascular diseases in the current global context - considering the growth in the upcoming years - is relevant to analyze universalist systems as the Brazilian one. Initiatives implemented in the country, focusing on the principle of integrality by an articulation between different levels of health care and involving different spheres of the government, allow further study of regional health systems. In this sense, although still being in a consolidation process, successful experiences of the Brazilian health system may bring data for the health system context of other countries, particularly for the organization of regional health systems and the optimization and rationalization of resources to achieve the integrality of a health care system.

The relevance of health systems for the treatment of cardiovascular diseases, the importance of using tracers for the evaluation of health care services and the representation of cardiovascular diseases in the work of health professionals justify the objective of this investigation.

This study aims to assess the attention to cardiovascular diseases, as a tracer of results for the articulation of the technologies in regional health systems.

Material and method

This evaluative research focused on the analysis of the support provided by health care systems, considering the production of diagnostic tests and hospitalizations for cardiovascular diseases in the region covered by the *Departamento Regional de Saúde XIII* (DRS-XIII - Regional Health Department XIII).

The DRS-XIII comprises 26 municipalities in the northeast of São Paulo, Brazil, totaling approximately 1.3 million inhabitants (Brazil, 2014). Concerning the health management, municipalities are fully responsible for basic health care and develop managerial and preventive actions for the health, in individual and collective units that are complemented by secondary and tertiary attention levels. Each municipality, depending on organizational and structural conditions of health services, must ensure access for services under their own expense, also for accredited and contracted services of specialized attention and of higher complexity involving therapeutic, diagnostic, and hospitalization procedures.

In the DRS-XIII's territory, municipalities are organized in three Health Regions (HR) that have their respective Regional Management Committees (RMCs), namely: The Guarani Aquifer (ten municipalities, 807,106 inhabitants, with Ribeirão Preto being the largest municipality among them), Horizonte Verde (nine municipalities, 393,431 inhabitants - Sertãozinho is the largest municipality), Vale das Cachoeiras (seven municipalities, 127,452 inhabitants - Batatais is the largest municipality).

Attention and care offered by services for cardiovascular diseases is different in each HR, while electrocardiogram and echocardiogram tests are

available in all regions; other diagnostic tests are present only in the Guarani Aquifer, specifically in the city of Ribeirão Preto. There is an agreement between policy makers, based on the assistance planning, that defines counter-reference and reference mechanisms, ensuring the access to health services of higher complexity in the HR.

The main sources of data came from the secondary data provided by the SUS Department of Informatics (DATASUS), by DRS-XIII, particularly from the Information System (SIA-SUS) and Hospital Information System (SIH-SUS) as well as documents and technical reports available by the State and Municipal politicians.

Data were analyzed during the period from January 2000 to December 2010. All outpatient and inpatient procedures of attention to cardiovascular diseases were analyzed - those from the municipalities of DRS-XIII and registered at SIA-SUS and SIH-SUS totaling 774.463 diagnostic exams and 74.375 hospitalizations.

The variables related to outpatient and inpatient care were analyzed and this promotes actions specifically focused on cardiovascular diseases and the action integrality as a tracer. The variables selected for the analysis of the outpatient care were: local availability, number of procedures (electrocardiogram, echocardiogram, exercise stress test, Holter monitor, Ambulatory Blood Pressure Monitoring (ABPM), cardiac catheterization). The variables selected for the analysis of hospitalization were: local availability, number of surgical patients in cardiology and total admissions in clinical cardiology.

The data was stored in Microsoft Excel spreadsheets. The production of health services of the DRS-XIII was grouped according to outpatient services and hospitalization. For the data analysis, descriptive statistics of the variables studied were used, with frequencies and percentages; the comparison between hospitalizations was performed with the Chi-square test, considering statistically significant p-values lower than 5%. In all the analyzed procedures, time series were elaborated for the identification of trends and relation between these procedures during the period of study.

For a better analysis of procedures, the relationship between the latter and the rational use of

the available technologies a ration between procedures was established, allowing the inference of the complementarity of attention to the provision of comprehensive care to cardiovascular diseases and the consequent institutional responses to the diagnosis and monitoring process of these diseases. This analysis made possible the reconstruction of the logic of health care with empirical concrete data, and also we became aware about the effectiveness level of health actions in a given territory.

The discussion was developed based on the theoretical framework adopted, i.e., the regional organization of health systems, from the perspective of integrality in health, in its horizontal dimension, focusing on the assessment of how cardiovascular diseases are treated, as a tracer of results for the articulation of different health care levels (Kessner et al., 1992).

The study was carried out to ensure the performance of precepts in compliance with the Resolution 196/96 on research involving humans. The Research Ethics Committee of the Ribeirão Preto College of Nursing - University of São Paulo approved this study, under the protocol 1116/2010, and registered it in the National System of Information about Ethics on Research Involving Humans (Sisnep) under No. 5730.0.000.153-09.

Results

In the period studied, the production of diagnostic tests showed growth trends that have been intensified since 2008. However, it was possible to observe

that hospitalizations presented higher growth between 2001-2004, i.e., in previous periods to the increment of diagnostic tests in the region.

All tests carried out presented 137% of growth in the period, from 52,467 in 2000 to 124,681 in 2010. This increase was observed since that one with lower complexity levels - from electrocardiogram to cardiac catheterization, a complex examination, indicating that there was an expansion of services (Table 1).

The increase observed in the outpatient care (Table 1) represents a significant portion of the treatment of cardiovascular diseases; however, not all demands can be met in this health service modality. A higher supply may result, in the short term, in a higher need of hospital attention to emergency and elective cases, in general medical and surgical hospitalizations (cardiology).

To understand the relationship between outpatient and inpatient care, in HRs, in a certain period, 74,387 hospitalizations (cardiology area) - 19.8% (surgical hospitalization) and 80.2% (general hospitalization).

For a better analysis of hospitalizations, the annual increase was studied according to the type of hospitalization. General medical hospitalizations presented higher annual increases mainly in the first decade, while surgical hospitalizations presented growing trends during throughout the period of this study.

Hospitalizations were analyzed in relation to its resident population to get a more appropriate analysis of the supply. To this end, we used population

Table 1 - Percentage of diagnostic tests performed by the SUS, in cardiology (DRS-XIII), according exam type and year, Ribeirão Preto, São Paulo, 2000-2010

Exame	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
	%	%	%	%	%	%	%	%	%	%	%	
Electrocardiogram	6.8	7.1	7.7	5.8	5.9	7.4	8.4	8.1	12.6	13.4	16.8	100
Echocardiogram	6.9	7.9	8.5	7.3	7.5	8.9	9.4	8.2	10.9	11.8	12.9	100
Ergometric	7.8	7.6	8.0	7.2	7.7	8.8	9.0	7.4	11.1	12.7	12.5	100
Holter	7.0	9.0	7.4	9.0	7.0	7.4	8.3	9.0	10.9	13.0	11.9	100
AMBP	3.5	5.5	6.3	7.3	5.6	5.8	7.2	8.5	15.7	17.2	17.3	100
Catheterization	2.2	1.8	1.5	1.5	5.7	11.3	10.6	12.2	15.4	18.0	20.0	100
Total	6.8	7.1	7.8	6.1	6.2	7.7	8.6	8.1	12.4	13.2	16.1	100

data from the 2000 Brazilian Census, a period when the population of the DRS-XIII (total of 1,134,864 inhabitants), and from the 2010 Brazilian Census, a period when the population of the DRS-XIII was 1,327,989 inhabitants, dividing hospitalizations into medical and surgical.

The analysis of the ratio between population and medical and surgical hospitalizations (Table 2) shows that there was a decrease in the percentage of medical hospitalized patients and an increase in the percentage of surgical hospitalized patients - the difference statistically significant with $p = 0.0000$.

Considering the construction of networks should favor integrality, contemplating assistance in all levels of attention, we presented the the ratio between diagnostic testing and hospitalizations related to cardiology, in the period. Significant increases were observed in the proportion of tests, showing the expansion of outpatient care with diagnostic support, from the simplest to the most complex examinations. Such situation may indicate possible changes in the health care model with supply and use of preventive and diagnostic procedures. On the other hand, it is necessary to emphasize that the growing technological incorporation has an impact on the organization of health services and proce-

dures, with consequent increases in diagnostic tests.

The ratio between diagnostic tests and total hospitalizations (Table 3) shows an increase in the production of exams in relation to hospitalization, allowing us to infer that patients under outpatient care have more access to tests. Such situation is evident for electrocardiograms - in 2000, the number of electrocardiograms corresponded to 6.86 exams to one hospitalization, and that ratio increased to 16.51 electrocardiograms to one hospitalization in 2010.

The growth observed in the ratio of diagnostic tests in relation to hospitalization allows us to infer that the access to diagnostic procedures are increasing, and the treatments of cardiovascular diseases are becoming more qualified and decisive at outpatient level.

Discussion

By evaluating the production of diagnostic tests and hospitalizations in the DRS-XII area, using cardiovascular diseases as a tracer condition, the articulation between levels of attention and care in regional health system was evident, allowing us to infer, in this regional scenario, that attention to health is offered in a perspective that favors

Table 2 - Percentage of population with medical and surgical hospitalizations (cardiology), by the SUS, in the DRS-XIII, according to years. Ribeirão Preto, São Paulo, 2000-2010

Hospitalizations	2000		2010	
	Hospitalizations (N)	Hospitalized population (%)	Hospitalizations (N)	Hospitalized population (%)
Medical hospitalization	5095	0.45	4873	0.37
Surgical hospitalization	1023	0.09	1407	0.11

Table 3 - Ratio between diagnostic tests and total of hospitalizations (cardiology), in the DRS-XIII, by the SUS, according to examination and year. Ribeirão Preto, São Paulo, 2000-2010

Diagnostic tests	Hospitalizations (%)										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Electrocardiogram	6.86	7.01	7.08	4.92	4.80	6.51	7.37	7.39	12.13	11.81	16.51
Echocardiogram	1.13	1.26	1.26	1.01	0.99	1.26	1.33	1.21	1.69	1.69	2.04
Ergometric	0.37	0.35	0.34	0.29	0.29	0.36	0.37	0.32	0.50	0.52	0.58
ABPM	0.06	0.09	0.10	0.11	0.08	0.09	0.11	0.13	0.26	0.26	0.29
Holter	0.14	0.18	0.13	0.15	0.11	0.13	0.14	0.16	0.20	0.22	0.23
Catheterization	0.02	0.02	0.01	0.01	0.05	0.11	0.10	0.12	0.16	0.17	0.21

integrality, in its horizontal dimension. It is worth mentioning that, considering universal access, the expansion of supply and coverage of actions and health services is essential. For Brito-Silva, Bezerra and Tanaka (2012), the different conceptions around integrality include, among others, supply aspects, organization and coordination of health services. In this sense, the analysis of the production of diagnostic tests and hospitalization can be considered as a result indicator of articulation between levels of attention. However, more improvements are needed in the perspective of the construction of integrality in its vertical and equity dimension.

The high prevalence of cardiovascular diseases present in significant parcels of the Brazilian population, when used as a tracer of results, shows to be an adequate methodological strategy for evaluating the articulation of different levels of attention in the health system.

Despite being incipient, the use of tracers can be considered one of the most useful approaches to assess health care, i.e., an horizontal and sequential analysis of the service provided can be performed as well as the integral assessment of health services (Tanaka; Espírito Santo, 2008).

The current reality, and future perspective, is that cardiovascular diseases represent a significant parcel of the health care in the next years, justifying the need to analyze the loco-regional organization system of health, so that actions performed contemplate health promotion, disease prevention, early diagnosis, outpatient and inpatient treatment, as well as the appropriate following of cases.

The results of this study, expressed by the actions of health care that allow the inference in the articulation of different levels of complexity, showing significant growth in production of diagnostic tests, which indicates an increase in the supply of services that allow early diagnosis and the monitoring of patients with cardiovascular problems. It is worth highlighting the important growth in the production of electrocardiograms, a less complex test, able to diagnose/monitor the most common problems in community, indicating the improvement of quality of primary health care. This same concern is observed in Europe, where there is a strong tendency to form regional networks of care, thus strengthening pri-

mary health care that works as a gateway of health systems. This function legitimates and strengthens the coordination of specialized attention, as well as of reversal of “hospitalocentric” models found in some countries (Erskine, 2006).

The articulation between basic health care, the average and high complexity are a major challenge to be overcome in Brazil. The creation of the SUS boosted expressively the expansion of service coverage with emphasis in the supply of basic care, demanding actions of medium and high complexity (outpatient and inpatient). These are expressive and relevant actions to complement basic care, to guarantee the resolution and integrality of care (Brazil, 2006).

The increase observed in the production of diagnostic tests can be related to strategies that help the access of patients, promoting the early diagnosis of problems. Moreover it may reflect the supply of more structured services for the treatment of cardiovascular diseases. The expansion of coverage and access to health services represent an important step for the construction of health systems. The guarantee of access is the first answer that should be given by a health care system in its search for patients; it also requires the implementation of solid management structures involving planning, control, regulation and the evaluation of assistance.

The expansion of strategies for the strengthening of primary care in the SUS has been improving access to integral and continuous attention, being composed by a platform for the prevention and management of chronic diseases (Schmidt et al., 2011). However, ensuring access requires the removal of physical, financial and other obstacles to the use of the services available (Viacava et al., 2012).

Results show that there has also been a growth in the production of more complex tests, such as the Holter, ABPM and the cardiac catheterization, pointing out that there was an expansion in the supply of resources for diagnostic confirmation and/or monitoring of cases. These tests require human resources, materials and specialized equipment. The fact of being available in only one municipality in the region, seems to be the appropriate condition in a economy of scale, with rationalization of resources, but it also needs regional articulations

that favors regulated, equitable and suitable access, avoiding pent-up demands. More complex tests require the adoption of indication protocols that shall be agreed in the loco-regional system for the access and to minimize the accomplishment of multiple diagnostic tests without adequate medical indication. In Brazil, these examinations of high cost and complexity are performed most times by private health plan providers/contractors who provide services to the SUS.

The centralization of tests of higher complexity in a municipality, observed in this study has the following advantages: the rationalization of human and material resources, the increase in the use of equipment and materials; on the other hand, it requires the organization of counter-reference and reference fluxes to ensure patients access to tests. It is possible to note that the resulting optimization of health services of higher complexity, in a particular municipality, may cause additional costs for patients to access services that are not always considered by the regional health system.

Depending on the population size, it is not possible to provide enough resources for all demands. Thus the construction of networks of care with regional coverage contributes to the achievement of integrality, continuity, equity, medical health efficacy and efficiency of the health care system.

In the regionalization process, it is important to consider the various realities of the territories - with different designs from the point of view of needs and availability of resources often resulting in restrictions that affect integrality and humanization of care.

Regionalized and integrated networks of care is an indispensable factor for the qualification and continuity of health care, and has great importance for overcoming gaps in assistance, as well as on rationalization and optimization of assistance available resources (Silva, 2011).

However, for Lima et al. (2012), to move forward on questions relating to regionalization, it is necessary to consider territorial/geographical issues and characteristics, economic development, conditions for the organization and provision of regional health services and systems, and coordination/organization of the actors involved in an effort to establish consensus.

The current challenge of the SUS is related to mapping singularities, evaluating potentials and weaknesses of these scenarios and, through a cooperative and integrating management, proposing loco-regional solutions contemplating the patient's needs, and enabling and qualifying health regions as advocated by Decree 7,508\11.

Government initiatives to assess the impact of these changes on the system as a whole are still rare. An evaluation system for the performance of the SUS should consider its legal conception, its way of implementation and prioritized health problems, in addition of enabling the assess to what extent their objectives are being carried out (Viacava et al., 2004).

The performance of health services depends on the structure of the health system, on the understanding that its functioning should ensure the coverage of all health needs, considering its multiple determinants. In the process of assessing the performance of these systems, we must consider a fundamental condition the political, social and economical context that permeates the functioning of these systems (Viacava et al., 2012).

The increased production of tests in relation to hospitalizations observed in this study suggests the need to develop new investigations that allow the identification of the real impact on the health-disease process of cardiovascular diseases. It is important to identify if it is centered only in the diagnosis and therapy, or if there is an expansion of health promotion interventions and the prevention of comorbidities.

The increase observed in the number of surgical patients could be due to medical conditions of patients with inadequate responses to drug therapy, or even the aggravation of the pathology, demanding surgical correction. For the decrease in medical hospitalization, we could relate it to the strengthening of specialized and decisive attention to outpatients, thus decreasing the need for hospitalization.

On the other hand, it is important to monitor the hospital attention to avoid selection in the demand for hospitalization, since generally surgical hospitalizations are better paid than general medical hospitalizations.

In Europe, as a result of the conformation of health care networks, there was a decrease in the

number of hospitalizations, involving hospitals, primary health care services and specialized secondary care. The core of this change has to do with the expansion of the scope of actions of primary health care, in an effort to develop technologies of lower density and with relatively lower prices (Edwards; Hensher; Werneke, 1998).

The design of health care networks focused on cardiovascular diseases requires guarantee of access to health services from basic health care to highly complex interventions carried out at outpatient and/or inpatient level. The expansion of access to diagnostic services have implications for patient care and for their own health system, modifying the profile of the use of health services, including vertical and horizontal dimensions of integrality.

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