

# FAZERES DA SAÚDE COLETIVA EM MOVIMENTO

E-book – 2ª edição



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Organizadores

A pandemia agudizou um complexo conjunto de crises que “estavam aí” no cotidiano. A redução do financiamento das políticas públicas, de sua abrangência, da participação social na sua definição e controle, de desarticulação interfederativa, entre outras, aceleraram fortemente e se encadearam às demais iniciativas de fragilização das políticas públicas: fragmentação da institucionalidade democrática; o estímulo à violência cotidiana (bem visível na “arminha” com a mão estimulada por autoridades governamentais como marca de domínio e sinalização de crise fálca sem antecedentes); assédios à prática docente e de investigação e à autonomia das universidades; criminalização dos movimentos sociais; negligência às necessidades sociais e de saúde de segmentos mais vulneráveis da população. Ao mesmo tempo em que há patrocínio financeiro e cultural à elitização do acesso às ações e serviços públicos, exposição ao trabalho em políticas sociais em oposição ao endeusamento do trabalho que produz riquezas, destruição sem precedentes do ambiente natural e outras iniciativas que asfixiam a democracia e a vida, mais do que a própria pandemia. Nos sentimos convocados a reagir.

Pareceu-nos necessário e oportuno mobilizar a comunidade acadêmica do Programa de Pós-Graduação em Saúde Coletiva (PPGCol/UFRGS) a ativar suas redes para a sistematização de experiências de ensino, pesquisa e extensão (sim, aqui as políticas para o ensino superior e a inspiração em Anísio Teixeira e Paulo Freire persistem!) para compartilhamento amplo, como forma de resistência e como maneira de reinvenção das formas de fazer a educação e a ação de desenvolvimento social e da saúde no cotidiano. No contexto do desfinanciamento visível da saúde e da educação, do assédio cotidiano ao fazer docente, do esgotamento das já exíguas formas de apoio ao ingresso e permanência de estudantes no ensino superior, de intervenções nas universidades, de asfixia das vidas, pareceu-nos importante fomentar os “inéditos viáveis”, como nos ensinou Paulo Freire, soprando brisas de ar renovado nas iniciativas de docentes, técnicos e estudantes do Programa, assim como nas redes rizomáticas interinstitucionais que são produzidas desde as ações que realizam como fazeres docentes. Não nos surpreendemos em constatar que há muitas iniciativas civilizatórias de alta potência de produção de vida, que foram incorporadas nesta produção. (Texto retirado do capítulo inicial)

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# **Fazeres da saúde coletiva em movimento**

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2ª edição**



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## Cost of hospitalizations for stroke in Brazil and France

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### Introduction

**N**oncommunicable diseases (NCDs) accounts for about 71% of the cause of death worldwide (41 million deaths in 2016), the majority caused by the four major NCDs: the cardiovascular disease was responsible for 17.9 million deaths (44% of all NCDs deaths); cancer for 9.0 million deaths (22%); chronic respiratory disease for 3.8 million deaths (9%); and diabetes for 1.6 million deaths (4%). NCDs are multifactorial, that is, determined by several factors, whether social or individual. The major NCDs have four common risk factors: tobacco use, physical inactivity, unhealthy diet, and harmful alcohol use (WHO, 2018; WSO, 2019).

From all NCDs, ischemic heart disease and stroke are the leading causes of death and disability worldwide. A total of 15 million people suffered a stroke and 5.8 million deaths. They have remained the leading cause of death in the world over the past 15 years. Stroke claims more lives annually than AIDS, tuberculosis, and malaria combined (WHO, 2018; WSO, 2019).

In Brazil, noncommunicable diseases (NCDs) were responsible for 577.308 deaths (2016) and for about 70% of healthcare expenditures in Brazil (WHO, 2018; WSO, 2019). The stroke has an annual incidence

of 226.800 inhabitants, and the mortality rate due stroke is approximately 68.000 deaths annually (2016) (BRASIL, 2019; BOTELHO *et al.*, 2016). In France, NCDs were responsible for 488.500 deaths (2016) (WHO, 2018) and the total cost of care related were responsible for about 45% of the healthcare expenditures (AMELI, 2021). The stroke had an annual incidence of 140.000 inhabitants and approximately 30.000 people die each year from stroke (WHO, 2019; FONDATION POUR LA RECHERCHE SUR LES AVC, 2019; INDEXMUNDI, 2019).

There are very few studies on healthcare costs in general. There are also very few costs comparison studies across countries. For these reasons, this research was intended to compare the costs of two different countries in order to obtain a more accurate view on the subject. The relevance of cost information is in the relationship between costs and the guarantee of rights. Holmes and Sunstein (2000) highlight that “rights” cannot be protected or applied without public resources, and these “rights” have costs, including the right to health (not restricted to social rights as the provision of goods and services by the State). It is necessary to allocate public resources, so it is important to know how much of the public resources are necessary to guarantee the rights and manage these resources better so that the results of implemented policies (effectiveness) are optimized (VIEIRA, 2017).

The correct information is important because wrong and skewed information lead managers to make inappropriate decisions, even if they have the best cost-finding technique (BEULK; BERTO, 2005). In the health sector, knowledge of the costs of procedures and the main products are essential to support decisions that promote hospitals’ financial stability and national healthcare systems (VIEIRA, 2017). It was not intended to deepen the discussion on all types of costs that exist (direct cost; fixed; variable; indirect; marginal; unitary; non-operational; operational), only to explain clearly and simply some concepts for the better understanding of the results that are presented following, and the relationship between the results and health indicators. This research presents the in-hospital costs in Brazilian and French healthcare systems due to stroke hospitalizations.

## Method

This is a descriptive research, with secondary data collection and analysis. The data were collected from the websites: DATASUS (official health information system in Brazil) and ATIH (website containing information on hospitalization in France) for the costs and the average cost of acute hospitalizations by stroke.

In Brazil, the costs express the value of resources spent by Brazilian Healthcare System (SUS) in the provision of hospital care, and the processing of information is performed centrally by Informatic Department of SUS – DATASUS (<https://datasus.saude.gov.br/>). The hospitalization's information is available on the financial resources allocated to each hospital that integrates SUS, the volume of hospitalizations /month, the principal diagnosis of hospitalizations, the procedures performed, the number of beds for each specialty, and the average time patient's stay. The entire public system uses a single price list (historical average of all invoices submitted by service providers, public or private), defined by the Ministry of Health, which establishes payment for procedures separating them into components: Professional Services, Hospital Services, Diagnostic Services, Therapies, Professional Acts, Special Materials, Medicines, Orthotics and Prostheses. In other words, the item hospital costs include hospitality, maintenance, food, medicines, professional services, exams, and procedures (BRASIL, 2017).

In France, the national cost study collects data from public and private health establishments, with activities in medicine, surgery, obstetrics, and dentistry (MCO), according to the categories of activities: major category of diagnosis, a major sub-category of diagnosis, root, and classification in homogeneous groups of sick. The methodology for this study is available on the Technical Agency for Information on Hospital Care (ATIH) website. Based on the data collected, a national cost benchmark by the financing sector is constructed (DGF for public establishments and OQN for private ones). These data contain the average cost of hospitalization according to the classification in homogeneous groups of patients each year. These costs result from a



statistical recovery process using national data collected by the information systems medicalization program (PMSI). The results are available from 2013, and, for previous years, the cost reference is found in this link: <https://www.scansante.fr/enc-mco>.

No cost calculations were made because the costs (total and average cost) were already calculated and available to download. The costs were available in Reais (BRL) for Brazil and Euros (EUR) for France. It was necessary to convert these values into PPP – Purchasing Power Parities (PPP) – the rate of currency conversion that tries to equalize the purchasing power of different currencies by eliminating the differences in price levels between countries' costs of acute hospital admissions. This indicator is measured in terms of national currency per US dollar. It was consulted OECD website where these rates are available (OECD, 2019). For the currency conversion, the following simple mathematical calculation was made: total annual cost divided by the annual PPP value, like any currency conversion.

$$\text{PPP} = \frac{\text{Total annual hospitalization cost}}{\text{PPP currency annual rate}}$$

### **Cost allocation in health management**

The expense is recognized as a cost when the production factors are used to manufacture a product or perform a service. The concept of cost refers to the valuation of all resources used in producing a good or service. In the health field, the term cost information refers to knowledge of the costs of providing goods, actions, and services, policies, programs, and the maintenance of health facilities. It is a meta-information that describes the information as a summary of others, presenting answers to questions about how and how much resources were consumed in the processes. From these data, it is possible to propose measures to improve health services (VIEIRA, 2017). There is no consensus among the authors on the nomenclature used for such methods. The institution is responsible for analyzing and deciding which is the most appropriate method to achieve its objectives. The

methods are not exclusive and can be used mutually. Table 1 below shows the differences between the most used methods.

Frame 1: Usual methods for calculating costing in organizations

<b>Costs</b>	<b>Method</b>
Absorption	It fully appropriates all costs (direct, indirect, fixed and variable) to the final products / services. That is, all expenses related to the manufacturing effort or all expenses for a service are distributed to all products / services.
Direct or Variable Costing	It separates the variable costs and fixed costs, being appropriate to products and services only costs that vary with their volume of production. The fixed costs are considered expenses for the period, and their values are allocated directly to the result. It is generally used for managerial purposes as a tool to assist management in making decisions.
ABC Activity-Based Costing	Analyzes the activities carried out within the institution and their respective relationships with cost objects. The basic principle of this system is to make as many proportional and non-proportional costs as possible through cost drivers. It is a costing system that is still very new and little tested. ABC costing is suitable for complex organizations, where products consume resources in a very heterogeneous way.

Source: BEULK; BERTO, 2005.

### **Cost allocation in National Healthcare System (SUS) – Brazil**

The cost allocation method adopted in SUS is absorption costing because it identifies the real costs of the final products or services and fully appropriates all costs to the final products/services. It is the most used among institutions linked to SUS. Another important factor is that its calculation is possible based on the institution's segmentation into cost centers. Thus, in hospitals, segmentation into specialized areas is easily identified, such as hospitalization, operating room, laundry,

nutrition, administration, laboratory. The cost must absorb variable costs (the amount is affected by the quantity produced) the fixed costs (not affected by the produced). This costing method allows allocating the expenses of the organization's central administration to the other units. This method applied in health establishments, such as hospitals and emergency care units, makes it possible to know the unit's total cost, by cost centers, by cost item, and by the average cost of care or the patient. With the adoption of the absorption costing method, it is possible to know the total cost of the operating room and the patient's average cost without differentiating it by the type of surgery to which he was submitted. The costs can be estimated and compared with the final service costs. The absorption costing system controls the cost and performance of the entity and the cost centers, comparing the estimated costs with the budgeted values. It will generally indicate when the institution's costs will exceed the budgeted amounts. This methodology is reliable. It allocates all costs to the final products/services; ensures a unitary view of each service's total cost, provided that all costs are absorbed (VIEIRA, 2017; BRASIL, 2006). The National Cost Management Program (PNGC), which was created through a technical manual prepared by the Ministry of Health in 2005, has as main objective the generation, improvement, and dissemination of cost-relevant information. PNGC provides a standardized methodology and specific information system and technical support in all phases of the implementation of cost management for all SUS entities (JAQUES; SIMÕES; SANTOS, 2017).

The PNGC helps managers to prepare the budget based on the calculated costs, to plan the resources available in health services, in decision-making and in the adoption of reasonable measures to reduce costs, without negatively impacting the quality of the service (increasing efficiency without jeopardizing effectiveness); estimate the final value of a new service and procedure, decide on the investment in new health procedures, clearly identify the cost centers that consume more resources than planned, and detect waste (BRASIL, 2017; MINISTÉRIO DA SAÚDE, 2017).

By classifying the cost centers, the segmentation in specialized areas of the entities is easily identified, such as laboratory, ward,

nutrition service, administrative services. The composition of cost centers must be under the organization’s strategic planning (JAQUES; SIMÕES; SANTOS, 2017). For satisfactory results, the cost centers must have a relationship network among departments to facilitate the allocation of their expenses. There is reciprocal participation between the non-productive cost centers. This fact is considered before making the final apportionment among the cost centers (BRASIL, 2020), which allows the cost information to be used in decision making from a more macro perspective. It has less complex implementation (VIEIRA, 2017). SUS uses care parameters, historical value series, and services to ascertain the real costs of services, especially high-cost ones such as oncology and organ transplants, or widely used services such as immunobiological. The payment to SUS institutions is made by a “package” of services; as it is national, the gain in scale greatly reduces the values (ex. purchase of vaccines, medicines, technologies) (BRASIL, 2006). Table 2 shows the cost management through the Cost Centers and their groups, which may vary according to each health institution’s specificity and/or interest, but this is a general idea of how it works.

Frame 2: Cost Management in SUS (Resource Allocation by Cost Center and its groups)

Cost Center	Groups	Activities
<b>Administrative Cost Center</b>	Administration Group	Administrative and management activities (advisory, planning, financial: medicine, nursing, risk management, cost management, superintendence, HR management, accounting, billing and treasury)
	Computer Group	Computer activities (customer and network support area, systems development, support and production)
	Condominium Group	Costs related to infrastructure (security, telephony, waste collection, elevators and transport)
	Supply Group	Inventory control and input supply activities (warehouse, shopping, pharmacy, chemotherapy, parenteral nutrition and medical gases)
	Engineering and Maintenance Group	Engineering and maintenance activities (boiler, clinical and civil engineering and infrastructure and maintenance)

<b>Intermediate Cost Center</b>	Assistance Support Group	Assistance support (physiotherapy, psychology, social work, speech therapy)
	Surgical Center Group	Activities in the operating room (anesthesia, operating room, post-anesthetic recovery)
	Obstetric Center Group	Surgical activities of obstetrics
	Image Group	Imaging area (bone densitometry, echocardiogram, mammography, nuclear / radioisotope medicine, hospital and outpatient radiology, magnetic resonance, computed tomography, ultrasound)
	Laboratory Group	Laboratory activities (specialty laboratory, clinical analysis, pathological anatomy)
	Graphic Methods Group	Graphic activities (electrocardiology, electroencephalography)
	Special Procedures Group	Examinations and/or treatments – high degree of complexity and specialization (hemodialysis, angiography, cystoscopy, ergometry, treadmill, blood center – exams, blood bank, transfusion, radiotherapy, urodynamics, gynecological cystoscopy, vectorcardiogram)
	Intensive Care Unit Group	Intensive and semi-intensive hospitalization activities (adult, pediatric, neonatal)
	General Support Group	General support to all other cost centers (sterilized material center – CME, laundry, cleaning, linen and sewing)
	Group Technical Commissions	Technical commissions (hospital infection, ethics, death, others)
	Teaching Group	Teaching activity and medical residency
	Nutrition Group	Nutrition and diet activity (milk bank, lactation, enteral/parenteral diets, dietary nutrition)
	Medical and Statistical Archive Group	Medical file activity and hospitalization statistics
<b>Final Cost Center</b>	Ambulatory Group	General and specialty outpatient clinics (medical and non-medical)
	Nursery Group	Nursery-related costs
	Inpatient Group	All inpatient units (surgical, gynecological, medical, obstetric, pediatric, orthopedic, psychiatric, private/health insurance), except nursery and ICU.
	Urgency and Emergency Unit Group	Urgent and emergency care (emergency room; adults and children)
<b>External Cost Center</b>	External activities, services and demands	They are centers that receive the costs of activities or services provided to patients not linked to the hospital (external demands).

Source: BRASIL, 2006; MINISTÉRIO DA SAÚDE, 2017.

To calculate the average cost, as the cost of hospitalization, the SUS does so by specialties, in a given geographic space, in the year considered. The hospitalization indicator shows the information on the distribution of hospital admissions performed, according to the classification adopted in the Ministry of Health tables for purposes of payment in SUS. Thus, SUS's average value of resources in the provision of hospital care and the specialties provided is expressed. Variations may occur due to the relative frequency of the types of service as they have differentiated remuneration. The classification of hospital services provided by SUS and the remuneration values are shown in tables adopted by the Health Assistance Secretariat of the Ministry of Health (MINISTÉRIO DA SAÚDE, 2017; BRASIL, 2000).

The method of calculating the average value of hospitalizations in SUS is shown below:

$$\frac{\text{Value of expenditure on hospital admissions in the specialty}}{\text{Total number of hospitalizations in the specialty}} \times 1,000$$

The available data come from the SUS Hospital Information System – SIH/SUS, managed by the Ministry of Health, through the Health Assistance Secretariat, in conjunction with the State Health Secretariats and the Municipal Health Secretariats, being processed by DATASUS, from the Executive Secretariat of the Ministry of Health. The Hospitalization Authorization (AIH) is the document to identify the patient and the services provided under the hospitalization regime and provide information for the Hospital Information System's management. It is generated when there is an admission to a public or private hospital, and it is through this document, the billing of hospital services in SUS is made feasible. AIH is issued exclusively by SUS, with its numbering. There are two types of AIH: Initial AIH – for initial hospitalization and continuity AIH (long stay – for psychiatric cases and patients under long-term care. Hospitals participating in SUS (public or private insured) send information on hospitalizations made through the AIH electronically (online transmission). This information is processed in DATASUS, generating the main information, and

forming the Database of hospital admissions in Brazil. SIH/SUS collects more than 50 variables related to hospitalizations: identification and qualification of the patient, procedures, examinations, medical acts performed, diagnosis, the reason for discharge, amounts due (BRASIL, 2020). SUS has two perspectives for applying cost management: 1) the macro view of a SUS manager at the federal, state, and municipal levels and, 2) the micro view of health unit managers. In the first perspective, cost management is materialized by making decisions about national health policies and programs and establishing administrative measures that impact the SUS, whether at the national or local level. Cost information is crucial for preparing and monitoring management contracts, dimensioning the resources, and deciding on more efficient remuneration models for reimbursement of services for establishments. It can also be used to support the adoption of incentives to promote efficiency in using resources (VIEIRA, 2017).

### **Cost allocation in the National Healthcare System – France**

In 1982, the French Ministry for social affairs introduced the Diagnosis Related Groups (DRG) system as a method for financial regulation and hospital management, classifying hospital admissions through “*Groupes homogènes de malades*” (GHM) as part of the medicalization program of the information system (PMSI). The GHM enables to describe the short-term activity and compare the productivity of the establishments among them, observing hospital production based on the patients’ characteristics and the health care service (POUVOURVILLE, 1990). After 2004, GHM started to be used as a payment form to activity-based pricing (or T2A) in public and private hospital sectors, establishing an incentive for cost efficiency (linking the revenue to activity), measured by its production in the length of stay classified in GHM, and the establishment of a national tariff applicable to all healthcare establishments. The State as the sole payer, through Assurance Maladie, imposes a single tariff in the territory and a macroeconomic regulation of hospital expenses (POUVOURVILLE, 2009).

A National Cost Study (ENC in French) is carried out in annual surveys by the *Agence Technique de l'Information sur l'Hospitalisation* (ATIH) over the fields Medical-surgical-obstetric (MCO), Follow-up and Rehabilitation Care (SSR in French) and Home Hospitalization (HAD in French) to find out the costs of health services. The goal is to produce a cost benchmark for each of these fields and calculate the costs of hospitalization per stay for MCO by an anonymous weekly summary (RHA in French) for full hospitalization and RHA for partial hospitalization for SSR, by sequence for HAD. These surveys take place through voluntary establishments or those selected (recruitment process governed by decree n° 2016-1273 of September 28, 2016) relating to the National cost studies (article L. 6113-11, of the public health code). Participation implies a commitment from the establishment via an agreement and a quality charter over nearly three years. From the collection and analysis of these data, the consolidation of the data set on individual costs is made, which are used to build a national cost reference (ATIH, 2018). The ATIH's mission is to manage the financing system of the health establishments technically, contribute to the monitoring, financial and medico-economic analysis of these, and calculate the rates and costs of services [ATIH, 2012]. The average cost per GHM defines the establishment's tariffs and is calculated from the ENC database, bringing together three or four years of cost data collection. For example, to know the tariff for the year 2009, data from 2006, 2007, 2008, and 2009 were used, updating the costs before 2009 according to a rate calculated by aggregation of activity (OR; BELLANGER, 2011). According to the medical classification in GHM for MCO, GME for SSR, and GHPC for HAD, the national average costs are given according to the medical classification. A national cost is then produced using an adjustment process using national data collected by PMSI (ATIH, 2020).

To facilitate this process, the institution must rely on the Activity Tree as defined by the analytical tree available on the ATIH website, which presents the tree structure of analysis sections (SA). It covers all of the activities potentially present in a healthcare facility. The analytical principle underlying the rules defined for the ENC is that of



homogeneous sections. That consists of dividing a structure into analysis sections. Each of them comprises a grouping of means contributing to the same goal and whose activity can be measured by a Unit of Work (UO in French) (ATIH, 2018). The UO measures the output of the activity of an analysis section. The UO per SA for the part not assignable to the stay is the day of hospitalization. The ENC has Clinical Analysis Sections (SAC in French) for each complexity of health care. For the MCO, the Clinical Analysis Sections are defined based on the clinical services supporting patients in full hospitalization or partial hospitalization. These SAs, therefore, cover all the care activities carried out in health establishments as part of the short stay, regardless of the terms of care. These activities result in the production of Medical Unit Summaries (*Résumés d' Unité Médicale – RUM in French*) in the PMSI. Resuscitation activities are the only SAs to give rise to the production of Medical Unit Summaries (RUM) in the PMSI and medico-technical acts within the unit. The establishment relies on the analytical tree to create as many SAs as necessary, depending on the specialties and care modes (ATIH, 2018).

To the SSR, the clinical analysis sections are defined based on the clinical services supporting patients in full hospitalization (including hospitalization during the week), part-time day and night, and the sessions. Therefore, they cover all the care activities carried out in the structures for all the care modes. The establishment relies on the analytical tree to create as many SAs as necessary, depending on illness treated, the health care services, and the patients' age (ATIH, 2018).

At the end of each ENC campaign, ATIH publishes the average costs: during the stay, by homogeneous patient group (DRG/GHM) in MCO; by the day, by medico-economic group (GME) in SSR; by the day, by homogeneous care group (GHPC) in HAD; by the day, by a group of residents in EHPAD. The costs considered include, in addition to operating expenses, overheads, and capital costs. Teaching and research remain excluded from DRGs; other activities, for example, psychiatry, are not yet considered. The cost structure differs between public or private non-profit hospitals, known as ex-DG (global endowment), and private for-profit clinics, known as ex-OQN (national

quantified objectives) (OR; BELLANGER, 2011). Certain direct and indirect costs linked to the establishment's operation, such as energy costs, cleaning, works, and restoration, are prorated and allocated to the activity considered closest to this service. For each section of the study, a unit cost of the UO is calculated by dividing the total of the residual net expenses of the section by the total activity, measured through the UOs [ATIH, 2018], as shown below:

$$\text{Unit cost of the UO} = \frac{\text{net residual charges of the section}}{\text{total activity of the section}}$$

The costs are then transferred to the stays/sequences in proportion to the number of UO consumed, as shown below:

$$\text{Transfer} = \text{UO Total from each stay/sequence} * \text{UO unit cost}$$

The Clinical Analysis Sections (SAC) are defined based on the MCO clinical services supporting patients in full hospitalization or partial hospitalization. These SACs, therefore, cover all the care activities carried out in health establishments. These activities result in the production of Medical Unit Summaries (RUM) in the PMSI. Resuscitation activities are the only SACs that produce both the Medical Unit Summaries (RUM) and medico-technical acts within the unit in the PMSI. The institution relies on the analytical tree to create as many SAC as necessary, depending on specialties and support methods. Activities benefiting from specific funding must be distinguished as intensive care in neurovascular units and outside neuro-vascular units; the neurovascular unit outside intensive care; continuous pediatric and non-pediatric surveillance; neonatology without intensive care or with intensive care; the interregional secure hospital unit; the Short-Term Hospitalization Unit (UHCD); palliative care units (the list will be updated annually on the ATIH website, and it is mandatory only if the establishment has a unit dedicated to it). The establishment has the possibility of having a finer division than what is proposed there insofar as it can follow its loads in the same way [ATIH, 2019]. Table 3 shows the cost management through the ENC, but the frame does not represent all DRG complexity, it is just a way to show an idea about this costing system.

Frame 3: Cost Management in FNS through DRG and their Groups

Sector	Groups	Activities
MCO Analysis sections	SAC*	The SACs are allocated the share of the expenses of medical, nursing and other personnel contributing to their activity, medical expenses and other expenses related to the operation of these accommodation units.
	SAMT	Emergencies; SMUR; laboratories for biological medical analyzes (biochemistry, immunology, microbiology, etc.), anatomo-pathology; operating theaters (surgical, obstetrical, pediatric, ambulatory); imaging; anesthesiology; rehabilitation and re-education; functional explorations; the hyperbaric chamber; radiotherapy; protected brachytherapy rooms; dialysis; other medico-technical activities carried out in the establishment (mode of operation: internal, subcontracting, groups).
	LM LGG STR	Hospitality and general charges allocated within the Logistics and General Management (LGG) sections; the Medical Logistics (LM) sections – costs of the pharmacy; costs of the biomedical engineering service; Restoration; Laundry; Administrative services; Reception and management; Upkeep-maintenance; Information System Department; Department of Medical Information Service; activity of professionals for the processing, management and control of medical information and its analysis; patient transport (excluding SMUR); Stretcher.
SSR Analysis Sections	SAC**	Staff costs (medical, nursing and other personnel contributing to their activity), expenses of a medical nature and expenses of other nature related to the operation of these accommodation units
	SAMT RR Plateaux	Staff costs (excluding RR personnel), medical expenses and another nature related to the operation of these platforms
	SAMT RR Professionals	Staff costs dedicated to the rehabilitation activity (employees of the SSR structure, temporary staff, liberal workers billing per shift)
	SAMT	Imaging (radiology, ultrasound, MRI, etc.); biological medical analysis laboratories; functional explorations (cardiac, respiratory, neurological, urodynamic); other medico-technical activities carried out in the establishment; medical charges and charges of other linked to the operation of these medico-technical platforms.

	LM LGG STR	Hospitality costs and general nature must be allocated within the Logistics and General Management (LGG) sections. Where applicable, to the Medical Logistics (LM) sections – the operating costs of the pharmacy service to the consumer sections and to the sequences; operating costs of the biomedical engineering service to consuming sections and sequences.
HAD Analysis sections	SAMT Intervenants***	Exclusively staff costs, whether the worker is an employee, temporary freelance worker or made available to the establishment
	SA Intervenants transport	Carrying out rounds to the homes of workers' patients (staff corresponding to the transport phase of salaried and liberal workers; operation and maintenance of the vehicle fleet dedicated to rounds of workers; kilometer reimbursements paid to salaried workers using their personal vehicle when carrying out their rounds; for liberal workers: the amounts indicated on the invoices)
	SAMT	Imaging; biological medical analysis laboratories; functional explorations; other medico-technical activities carried out in the establishment. Charges of a medical nature and charges of other nature linked to the functioning of these trays
	LM LGG STR	The maintenance and delivery activity of pharmaceutical specialties, consumables and equipment installed at the patient's home, whether this is carried out by salaried staff of the structure or by subcontractors.

Source: [ATIH, 2018].

\*The UO for resuscitation SACs for the charges of medical and nursing staff is the omega. It is used to transfer the charges of medical personnel, on-call duty and nursing staff onto the RSA. This calculation is detailed in the instruction document published on the ATIH website. \*\*The SACs' UO for the Nursing Staff is the SIIPS point (Individualized Nursing Score to the Caregiver). It is used to dump the charges of nursing staff on the RHAs.

\*\*\*This section only concerns DAF/ex-DG establishments. In OQN/ex-OQN, the activities of consultations and outpatient care are the liberal activity of practitioners. All charges incurred by establishments in this regard give rise to reimbursement within the framework of the fees.

The ATIH provides two software for the transmission of data, which the participating institution must use: ARCA<sup>n</sup>H (Assistance in the Realization of Hospital Analytical Accounting): allows the entry

of accounting data according to the ENC methodology and; ARAMIS (Anonymized Collection of Medical Data and Stay Information): allows the anonymization of the monitoring files of loads and units of work during the stay and PMSI files (ATIH, 2018).

## Results

Table 1: Cost of acute hospitalization for stroke in Brazil and France (in Purchasing Power Parity 2010-2017)

Year	Total Cost		Average Cost	
	Brazil	France	Brazil	France
2010	57,752,274.37	360,456,049.43	497.15	5,687.00
2011	63,080,737.50	402,875,229.50	509.35	4,087.57
2012	69,540,106.35	398,613,166.40	548.40	4,276.90
2013	76,957,407.54	420,415,564.70	575.07	4,301.90
2014	84,798,287.77	415,759,793.50	597.55	4,359.10
2015	89,465,374.32	506,752,512.30	612.90	5,191.90
2016	94,610,292.36	542,691,629.40	632.35	5,074.90
2017	100,434,006.06	527,791,866.20	658.41	4,977.20
Total	636,638,486.27,	3,575,355,811.43		
Average	79,579,810.78	446,919,476.42		

Source: ATIH, 2019; BRASIL, 2012; MINISTÉRIO DA SAÚDE, 2018.

About the acute stroke hospitalizations costs from 2010 to 2017 – remembering the currency refers to the monetary conversion in international PPP, allowing the comparison between two different currencies through the analysis of the cost of acute hospitalizations for stroke, Brazil has an average expenditure of PPP 79,579,810.78 per year and France has PPP 446,919,476.40, which means an expense greater than 500% for France concerning the Brazilian expenditure, for the same purpose.

## Discussion

About the cost of acute hospitalization for stroke in Brazil and France, two hypotheses could be raised: 1) the cost is lower in Brazil since the facilities are larger, enabling economies of scale? 2) The different ways of allocating and managing costs can interfere with the final cost?

It was begun with the first hypothesis; economies of scale are discussed. Economies of scale occur when long-term average costs decrease as the volume of activities increases, and fixed costs are spread over a larger number of these activities. Economies of scale are more likely to occur when fixed costs are higher than variable production costs, common in health services (MENDES, 2011). The reduction in idle capacity produces an increase in revenue due to economies of scale due to increased patients (SOUZA; SCATENA, 2010).

As Brazil is a country of continental dimensions and has a unique healthcare system, economies of scale are obtained from purchasing in large quantities (medicines, technologies, human resources, equipment, and materials) and spending on infrastructure, number of beds, and establishments. There are economies of scale in the hospital activity, mainly due to its high degree of specialization and technological intensity: the more assistance a unit performs, the greater the probability of obtaining favorable clinical results (YAMADA, 2011).

Another way to achieve economies of scale is the “Consortium.” The consortium between cities in Brazil is a form of a regional partnership developed in SUS over the 1990s. It is expressed by the Intermunicipal Health Consortia (partnerships established among cities that agree on rules for financing services) based on resources from associated municipalities. The municipalities are organized cooperatively, concentrating in a host city that requires a greater number of procedures to have an adequate scale and quality, as the hospitals (MENDES, 2011; RIBEIRO; COSTA, 2000). When there is an increase in activity level, the variable costs increase; however, fixed costs do not increase, causing a positive variation in the result (YAMADA, 2011).

In general, consortia aim to expand the supply of medical specialists or services with a higher technological density. Small

municipalities are service buyers from the host municipality, capitalizing their offer and generating economies of scale. In regions where there are several small municipalities, the consortia represent an expansion in the offer of specialized services close to residence. In this sense, the logic of cooperation tends to overcome competition for resources from other spheres of government (RIBEIRO; COSTA, 2000).

On the other hand, the second hypothesis – The different ways of allocating and managing costs can interfere with the final cost? It could be a good way to think about the differences found out. In absorption costing, the patient's average cost per cost center is obtained, but the cost of the activities performed in the care is not known. For example, a surgical center where several surgeries are performed per month: appendectomy, mastectomy, neurosurgery, among others; using the adoption of the absorption costing method, it is possible to know the total cost of the operating room and the average cost of the patient, without differentiating it by the type of surgery to which he was submitted. From the perspective of the health system manager, individualized cost information is relevant for creating groups of related diagnoses (GHM) (Diagnosis-Related Groups – DRG) to define reimbursement values for the service provided by public providers and private. In this model of remuneration to the provider, the cases are classified according to the following variables: principal and secondary diagnosis, age and sex of patients; the presence of comorbidities and complications; and procedures performed. A homogeneous pattern of resource consumption characterizes the cases classified as belonging to the same DRG, and by the same clinical significance, they are similar economically and clinically (NORONHA, 2001). In this case, the cost information of the patient is important not for isolated use or to deal with the reimbursement of a case, but rather to guide the average cost per DRG, which in turn will serve as an input for the calculation of the reimbursement value by DRG by the health system manager.

In DRG, the costs of activities are known, but not the total costs from the cost centers and health unit. However, we can know the average cost of each type of surgery or the procedure performed, if the processes and activities for performing these surgeries have been previously

defined. Currently, the absorption and DRG costing methods complement each other in the production of cost information. The decision to start the deployment using one method or another depends on the priority perspective for using the information. If the objective is the macro view of the system, absorption costing is better, which provides complete information on costs, and then moves on to DRG, which is very centered on process management. Vieira suggests that it would be more rational to move from the least complex method to the most complex, starting with absorption costing for DRG (VIEIRA, 2017). The Brazilian choice for the absorption method may be why the costs of hospital treatment for stroke seem much lower in Brazil than in France. If the DRG method had been used, the costs might have been different.

According to Pouvourville, the French model is more like a regulatory model administered by establishment activity and productivity tariffs than to a model of competition by comparison implemented in the United States by Medicare. In terms of resource allocation, the consequences of this model are analyzed in the light of a selection of theoretical and empirical works on the economic incentives induced by the prospective payment on a case-by-case basis. Based on an annual objective for the evolution of public sector hospital expenditure reimbursed by health insurance voted by Parliament, a regional allocation of the corresponding budgetary masses was made, charged to the regional hospitalization agencies to distribute them among the establishments based on historical costs and, based on the difference between the unit costs of each establishment and the regional average cost. The less expensive establishments then enjoyed a higher authorized increase in their historical budget than the more expensive establishments. The definitive answer given by managers and payers to these problems is well known: payment is intended to cover expenses as a rule. Rate measures indirectly measure the effectiveness of a structure. The use of resources, without knowing whether they are being used wisely. The best known of these indicators are the number of admissions, the number of days, the number of acts performed, the bed occupancy rate, the average length of stay. The economic versions



of these indicators are the cost of procedures and length of stay. However, managers and payers have always been aware that these indicators were too aggregated. They did not allow us to measure the performance of the patient in institution. Thus, for a long time, the hospital managers and payers have been asking for alternatives. The instruments allowing them to identify hospital resources according to homogeneous categories of patients, diseases, or treatments are among them. Such tools have been available since the early 1980s (POUVOURVILLE, 1990).

At first glance, it seems that the Brazilian healthcare system is more effective than the French. In this case, we assume the inputs as the structure and human resources of the healthcare systems in both countries, remembering the inputs directly related to efficiency and operating costs. Efficacy, which is related to objectives and goals through planning the care (strategy and care technique), aiming the patient's cure, and is the work process (health policies and stroke care). Ultimately, the effectiveness is the result of this care. In other words, its resulting product. The reason for this choice lies in the fact the health measures are not measures of production volume. Instead of measuring the volume produced, the outputs used to seek to measure the healthcare system's average quality as a whole (DONABEDIAN, 1980a; DONABEDIAN, 1980b; YAMADA, 2011), within an operational and rational logic adapted from the industrial model. However, according to Pouvourville (1990):

It is difficult to measure the contribution of care to improving health status, and it is even more difficult to give a relative value to one state of health compared than another. Furthermore, the practice of medicine does not lend itself well to an analysis of the industrial type, where we relate factors of production and products, and where we can measure the productivity of a process. Indeed, the choice and the effectiveness of a treatment depends on the patient's general condition and some of his psychic and social characteristics, and there is no always a consensus within the medical profession on the therapeutic response to a given clinical problem (POUVOURVILLE, 1990, p. 33-34).

Although the total expenditure in Brazil's healthcare system may seem smaller than registered in developed countries, it is compatible with the regional standard and some OECD countries (BRASIL, 2013). To be effective, it is also necessary to have good results. The Brazilian healthcare system is efficient, efficacious, and effective. It could be said that the French healthcare system is efficient and effective, but not as efficient as the Brazilian one (see figure 1 and 2). Also, that both have structure, resources, technical knowledge, technologies, planning, and health policies to achieve the objectives proposed concerning stroke care.

So, a third hypothesis would be raised – the money exchange difference between Brazil (Real) and France (Euros) would lead to an illusion that Brazil spends less on stroke care. As the Brazilian currency fluctuates in the international exchange market, it would not, in reality, have its correct value. There is a value paid, a documented value, but it devalues over time and depends on the international scenario. Even if a calculation was made to bring Brazil's expenditures to present value, an error could be made. Despite being a probable and very interesting hypothesis, it is outside the scope of this research, and, for this reason, it will not be tested.

## **Conclusion**

The hypotheses discussed in this chapter are not sufficient to explain the difference in the costs of acute hospitalization by stroke between Brazil and France. So, even if the hypotheses above fail to fully explain the reasons why the Brazilian healthcare system spends less on its stroke care, the important is that Brazil has as good results as France. It could be said that the Brazilian healthcare system is more effective than the French. However, this statement would lead to an error because both healthcare systems are engaged to do the best stroke care possible. It can be inferred that the Brazilian healthcare system, when compared to the French healthcare system, is more efficient because it spends less. However, this efficiency could be relative and it needs new studies about that. In general, there is a problem to guarantee

financial resources in sufficient volume to ensure the constitutional right to health. In general, there is a problem to guarantee financial resources in sufficient volume to ensure the constitutional right to health. The ability to finance healthcare systems has been threatened in most countries due to changes in the demographic profile (aging of the population combined with the decrease in birth rates), the increased incidence of chronic diseases that consume many resources over long periods, the increase in life expectancy, the constant introduction of new technologies and medicines. The perception of the results of this research arouses the desire to expand knowledge in new studies. Several comparisons can be made about epidemiological studies on stroke care, such as primary health care related to health prevention (risk factors), emergency care; telemedicine; case-mix between cities of the same size; comparison of post-stroke care; between sex and age group.

This research had the following limitations: It was not made an in-depth study of the cost allocation system to verify if there are significant differences about what was found in this research. Also, a proposal for a specific cost allocation method for the health sector based on a systematic review of these methods and, a case study and action research.

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