

Ischemic Heart Disease. Hospitalization, Length of Stay and Expenses in Brazil from 1993 to 1997

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Objective – To identify characteristics of the hospitalizations due to ischemic heart disease (IHD) made by the Single Health System – “Sistema Único de Saúde (SUS) in Brazil from 1993 to 1997.

Methods – The information used came from records of permissions for hospitalization due to IHD (diseases codified from 410 to 414 by the International Disease Classification – 9th Revision) furnished by the data bank DATA-SUS. The material studied was classified according to age, sex and length of hospitalization of the patients, and expenses to the system for IHD.

Results – IHD represents 1.0% of total hospitalizations. Angina pectoris was the most frequent type, occurring in 53.3% of the cases, followed by acute myocardial infarct (26.6%). This later was more frequent in men and angina in women. The majority of patients with IHD stayed hospitalized from 5 to 8 days. In the years of 1997 the expenses due to hospital treatment for IHD reach to 0.01% of Brazil's Gross Internal Product. In the studied period (1993-1997), IHD was responsible by 1.0% of hospitalizations, however it was 3.3% of the expenses of SUS.

Conclusion – IHD is an important cause of hospitalization by the SUS; it has a rather high cost, indicating the need for preventive measures aimed at reducing exposure to risk factors and to decrease the incidence of this group of diseases in the nation.

Keywords: ischemic heart disease, hospitalization, espenses

All over the world, cardiovascular diseases (CVD) are an important cause of death. By and large, this group of diseases represents a first cause, not only in developed but also in countries in the process of development. In Brazil, in the first half of the nineties, CVD were responsible for approximately 30% of all deaths^{1,2}.

Among CVDs, ischemic heart disease and its different clinical manifestations, stands out in magnitude. The importance of CVD, was stressed by several studies that revealed an increase of mortality due to IHD in São Paulo municipality from the forty to eight decades¹⁻⁶, followed by a fall⁷. Besides their marked participation in overall mortality^{1,7-9}.

Just as mortality studies encourage specific preventive activities, the analysis of the frequency of hospital morbidity by this group of diseases results in a greater source of information. Analysis of the causes of hospitalization permits the evaluation of their frequency, time of patients' stay in the hospital, expenses incurred and other factors. Considering that available medical resources permit ever earlier diagnosis and use of the latest generation of treatments leading to increased patient survival, records of hospital and outpatient morbidity have become the best and biggest source of information about these diseases, in particular, in their chronic forms.

Studies of morbidity statistics are difficult to perform, are performed less frequently and almost always refer only to limited population samples. Nevertheless, several investigators have approached this theme in studies on the prevalence of arterial hypertension in Rio Grande do Sul¹⁰, and on risk factors of chronic diseases, Rego et al¹¹, Martins et al,¹² and Chor, 1996¹³, among others.

The description of the pattern of morbidity of IHD in Brazil, as well as of its approximate magnitude in the country as a whole, can be made using the only available source, namely the hospitalization data supplied by the System of Hospitalization Information SIH/SUS. Even though this system deals only with hospitalizations paid for by the SUS, it represents 80% of the medical and hospital assistance of approximately 12 million hospitalizations per annum.

Data generated by records of admittances to the hospital are an easily assessed source of a large amount of in-

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formation allowing acquisition of data of fundamental importance for action in the health field.

Making use of such data, we aimed at the study of some characteristics of hospitalization due to ischemic heart disease, from 1993 to 1997, including types of manifestations, sex and age of the patients, as well as of duration and costs of their hospitalizations.

Methods

The study used records of the gross of secondary hospitalizations paid for by the SUS, represented by authorizations for admittance to the hospital obtained via CD-ROM from the Health Ministry, DATASUS, for the period between 1993 and 1997. Data were selected according to the Ninth Revision of the International Disease Classification (CID-9), which provides the following disease specifications or descriptions:

Ischemic heart disease (IHD) (410-414): acute myocardial infarct (410); other acute or subacute forms of IHD (411) including acute coronary insufficiency, intermediary syndrome, Dressler's syndrome and pre-infarct; old myocardial infarct (412); angina pectoris (413) – including cardiac angina, angina decubitus, angina of effort and anginous syndrome; other forms of IHD (414) – including coronary atherosclerosis, atherosclerotic heart disease, coronary sclerosis, myocardial ischemia and heart aneurysm.

This group of diseases constitutes an aggregate within the chapter of circulatory diseases that was used in this study for comparisons between averaged in-hospital periods.

Cases were selected according to information referring to these manifestations or descriptions and were analyzed according to the characteristics of the patient: age, sex, mean duration of stay (in days) and amounts paid for hospitalization (in reais).

Results are presented as sums of cases between 1993 and 1997, with the exception of amounts paid for hospitalization, which refer to 1997 only, because data from preceding years were not available on CD-ROM.

The amounts paid for hospitalization represent the cost per hospitalization to the system and not real cost. Nevertheless, the term "cost" was used in this study as a synonym for the amount paid because it is recognized by usage. Expense, as well as time of permanence are limited by the rules of the SUS, and cannot, therefore, serve as parameters for international comparisons or even to affirm this to be the real expense or time of confinement for each case. They do allow, however, for comparisons to be made with other causes of hospitalization by the same system by the same rules.

Results

Between 1993 and 1997, 689,825 patients were admitted to the hospital due to IHD (410-414); they represent 10.1% of all hospitalizations due to circulatory diseases and 0.99% of the total authorizations for hospitalizations due to all causes. In relation to sex, the typical and specific pattern of this

group of diseases is worth noting; 54.3% of the hospitalizations due to IHD were males and 45.7% of females. This pattern is inverted when hospitalizations due to causes other than IHD are analyzed; here, 65% of the patients were women and 35%, men.

Their major cause for hospitalization being parturition or its complications, the high percentage of women hospitalized seems justifiable. However, even when hospitalizations due to parturition are excluded, 54.7% of the hospitalizations are still for females and 45.4% are for males.

Over the time span analyzed, a reduction (20.9%) from 15,617,080 to 12,351,464 of total hospitalizations was noted. Hospitalizations for circulatory diseases decreased 27.1% (from 1,613,070 to 1,176,300), and for ischemic heart disease 29.8% (from 168,216 to 118,090). Reduction of hospitalizations were observed for all causes the lowest one for ill-defined causes (5.3%), followed by respiratory disease (14.2%) and congenital abnormalities (14.7%). Reductions greater than those observed for IHD were observed only for infectious and parasitic diseases 34.6%; neoplasms 32.3%, genitourinary diseases 37.3% and osteomuscular diseases 33.5%. Data regarding manifestations or type of ischemic heart diseases are shown on table I.

The group representing cases of angina pectoris (which includes also others of this description – 413) was responsible for 53.3% of the total, with a higher frequency of females (60.8%) than males (47.0%). Acute myocardial infarction (410) was responsible for 26.5% of the total hospitalizations and it was more frequent in men. Diagnosis of old myocardial infarcts (412) was least frequent, 0.4% of the IHD. Table II shows the distribution of IHD according to age and sex.

As expected, frequency of hospitalization due to IHD increased with age in both sexes (table II). It was also noted that with the exception of cases of angina pectoris, hospitalization of male patients was higher for all age groups.

Cases of acute myocardial infarct were 13.1 higher for men aged 65 years or more, in comparison with those aged 35 years or less. Among women aged 65 years or more, the number of hospitalizations was 22.6 times higher than for those aged 35 years or less. However, when the total of hospitalizations due to IHD is taken into consideration, this difference practically disappeared, changing to 32.5 and 31.8 times, respectively. This suggests that acute myocardial infarcts, still an acute manifestation of a chronic disease, affect younger men more frequently. In females it is the result of a longer process, which is prevalent in older groups. A more specific focus using coefficients might confirm this appraisal.

Regarding length of hospitalization in days, results are shown in table III: angina pectoris cases (413) showed the lowest confinement. Both acute and subacute (411) and long-standing myocardial infarct and other forms of IHD (412 and 414) required on average the longest periods of hospitalization.

It is to be noted that the average increase in days of hospitalization in the group of other acute and subacute

Table I – Hospitalizations paid for by the SUS, according to sex and type of manifestation of ischemic heart diseases. Brazil, 1993-1997

Diagnosis	Males		Females		Total	
	n°	%	n°	%	n°	%
410 – Acute myocardial infarct	114649	30.8	67151	21.5	181800	26.6
411 – Other acute and subacute forms of ischemic hear disease	57494	15.5	37730	12.1	95224	13.9
412 - Long-standing myocardial infarct	1583	0.4	1040	0.3	2623	0.4
413 - Angina pectoris	174881	47.0	189991	60.8	364872	53.3
414 - Other forms of ischemic heart disease	23443	6.30	16828	5.4	40271	5.9
410 – 414	372050	100	312740	100	684790*	100

*Cases of uninformed sex are excluded from the total

Table II - Hospitalizations paid for by the SUS according to sex, age and type or manifestation of ischemic heart diseases. Brazil 1993-1997

Age/Sex Ischemic heart disease	15-24y		25-34y		35-44y		45-54y		55-64y		65or more y		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
410 – Acute myocardial infarct	489	262	2706	1203	11921	5108	25173	10883	32428	16582	41932	33113	114649	67151
411 - Other acute and subacute form of ischemic heart disease	224	186	920	687	5330	3138	13262	7651	18895	11582	18863	14486	57494	37730
412 – Old myocardial infarct	15	4	52	27	168	103	357	199	396	268	595	439	1583	1040
413 – Angina pectoris	1040	1156	4998	5216	18671	20122	37947	40200	49617	49958	62608	73339	174881	189991
414 – Other forms of ischemic heart disease	296	284	710	814	2371	1743	5268	3252	7343	4687	7455	6048	23443	16828
410 – 414	2064	1892	9386	7947	38461	30214	82007	62185	108679	83077	131453	127425	372050	312740

M - Male; F- Female

Table III – Average confinement (in days) during hospitalizations paid for by the SUS according to type of manifestation of ischemic cardiac disease

Ischemic cardiac disease	1993	1997
410 - Acute myocardial infarct	7.6	8.0
413 - Angina pectoris	5.6	5.9
412 e 414 – Old myocardial infarct and other forms of ischemic heart disease	8.0	8.8
410 – 414	6.5	7.2
Diseases of the circulatory system	7.2	7.2
All causes	6.7	6.4

forms of IHD (411) was 27.6%, but when comparing data for the whole of IHDs (410-414), an increase of 10.8% between 1993 and 1997 was observed.

Regarding the total of circulatory diseases, no changes were noted, but the average days of hospitalization for all causes had a small decrease.

The period of hospitalization for all types of IHD ranged between 5 and 8 days. Of the total number of hospitalizations due to IHD in 1997, 2.0% of patients remained in the hospital for 29 days or longer; the same percentage remained 22 to 28 days. However, as already mentioned, these data are limited by the rules of the SUS. Regarding cost, that is, the amounts paid by the SUS for hospitalizations in 1997, table IV shows its total value (in Reais) for IHD and its different manifestations. For comparison, amo-

unts referring to the total of hospitalizations due to all causes and the total of hospitalizations for diseases of the circulatory system are also shown.

Expenses for hospitalization for IHD in 1997 reached values above 100 million reais, corresponding to 3.3% of the total amount spent on hospitalization and approximately equivalent to 20% of that corresponding to the whole of hospitalizations due to circulatory system diseases. The average cost per hospitalization due to IHD was twice as high as the average value spent on diseases of the respiratory system and slightly more than three times higher than the average cost of the total number of hospitalizations for all causes.

Discussion

The number of hospitalizations due to IHD between 1993 and 1997 was rather high, equivalent to approximately 1% of hospitalizations for all causes. It should however be taken into account that this number may have been underestimated because doctors do not always report the basic disease, reporting instead only its complication, for example specifying cardiac insufficiency as congestive or not.

Actually, during the period studied, 2,345,981 patients were hospitalized with this diagnosis; its distribution by age group is similar to that of IHD. However, it can be verified that for cases of cardiac insufficiency no great difference exists between sexes, some age groups exhibiting a larger

number of hospitalizations of persons of the feminine sex. Despite this, it is not difficult to imagine an appreciable segment of this total of patients to have Ischemic heart disease as the primary or basic factor of illness.

For this reason, it can be stated almost with certainty that the number of hospitalizations due to IHD, as shown in the results, is a minimal one. It must also be recalled that besides cardiac insufficiency, part of the cases diagnosed as cardiac arrhythmia, heart disease and cardiopathy among others could also be added to this group.

Thus, we have to stress that the present analysis included only patients admitted to SUS or SUS-paid hospitals with exclusion of emergency room and day patients.

As already described, a decrease in the total number of hospitalizations was observed. This was due to a resolution of the Health Ministry, which extensively altered criteria for admittance for all causes; however, the reduction due to IHD (29.8%) was higher than the reduction for all causes (20.9%). It may be speculated that besides the administrative measures, which reduced hospitalizations, a decrease in cases of IHD had occurred. This fact has been described¹⁴ in regard to mortality in the State of São Paulo, which showed a decrease of 28.3%.

These data could lead to the hypothesis of a decreased incidence, influencing IHD mortality figures as described. However, this cannot be confirmed, because the present type of study would not be appropriate for this type of evaluation.

Regarding the type of the manifestations of IHD, we observed that angina pectoris - stood out with 53.3% of the cases, being the most frequent cause for hospitalization of women, followed by myocardial infarcts, more frequent in men. Admittances due to old myocardial infarcts were minimal at 0.4%.

Even though angina pectoris was responsible for the largest number of hospitalizations, it required the smallest average lengths of hospitalization, 5.6 and 5.9 days in 1993 and 1997, respectively. The highest average numbers of

days of hospitalization was that corresponding to other forms of acute and subacute ischemic heart disease, followed by old infarcts and other forms of IHD. The average length of the total hospitalizations due to IHD in 1997 was the same as that for hospitalizations due to circulatory diseases and greater than the average length of confinement for all other causes.

Results show that average days of hospitalization for IHD in all of its manifestations, especially those of the acute and subacute forms, increased 27.6% compared with those in 1993. However this is mainly the result of a single observation and cannot be used to form hypotheses. Mc Govern et al¹⁵, studying aspects and tendencies of mortality, morbidity, medical services and risk factors of acute myocardial disease in the metropolitan area of Minneapolis and St. Paul, Minnesota, USA, verified a decrease on in the average time of confinement due to acute heart infarcts from 1985 to 1990. It decreased from 8.5 to 6.2 days for males and from 8.9 to 6.9 days for females. This study allowed the authors to conclude that substantial changes had occurred in the proportion of patients who underwent special surgical procedures or used certain types of medication. Thus, the frequency of the use of thrombolytic therapy was more than twice as high (up from 13 to 30%), coronary angioplasty went from 5 to 21%, the use of aspirin from 27 to 81% and of heparin from 53 to 75%. In contrast, a moderate but statistically significant decline in the use of warfarin (down from 20 to 14%) and of beta-blockers (down from 56 to 50%) was observed. The authors discuss these findings, relating them mainly to the rate of hospitalization, decreased incidence and risk factors.

In our case as already mentioned, no discussion concerning alterations in average hospitalization times is possible. This is an interesting observation and deserves special study, for which it is important to remember that administrative factors controlling length of hospitalization may have occurred.

The results also show that hospitalization due to acute myocardial infarct in patients 65 years or older compared to with those less than 35 years old is considerably greater in females compared to with males (22.6 times against 13.1 times, respectively). This result agrees with that observed clinically and epidemiologically in other cases: frequency and mortality due to acute myocardial infarct in the aged are higher in women. It is worth pointing out, however, that this result was not observed for the group of hospitalizations due to ischemic heart diseases.

The results of the present study show that hospitalization expenses due to IHD in 1997 reached a value above 100 million reais. This represents approximately 0.012% of the gross national product of that year. The global expense with this disease can be evaluated by taking into account that this is the lowest amount spent on hospitalizations paid for by the SUS, and that the real cost of each condition studied was not taken into account.

We wish to point out that for the period between 1993 and 1997 hospitalizations due to IHD were 0.99% of the total and that the expenses (3.26%) paid for by the SUS with these hospitalizations cost three times as much as expenses for all other hospitalizations.

Table IV - Total and average expenses according to type of confinement. Ischemic heart disease, circulatory diseases and all causes		
Internment	Total value (R\$)	Average per confinement (R\$)
410 - Acute myocardial infarct	21.361.083,85	629,89
411 - Other acute and subacute forms of ischemic heart disease	38.397.717,84	2395,36
412 - old myocardial infarct	263.932,15	773,99
413 - Angina pectoris	29.411.985,51	480,72
414 - Other forms of ischemic heart disease	15.065.733,04	2.274,07
410 - 414	104.500.452,39	884,92
Diseases of the circulatory system	522.779.048,84	444,42
Diseases of the circulatory system except IHD	418.278.596,45	395,26
Total hospitalizations	3.205.852.023,00	259,55
Total hospitalizations minus IHD	3.101.351.570,61	253,51

In truth, expenses due to IHD are rather high in Brazil, running above those of other diseases and leading the SUS to adopt measures aimed at the reduction of hospitalizations as well as length of time of confinement. Such reductions could be achieved on in the medium- or long-

range by supplying resources to be applied to educational activities aimed at the reduction of exposure to risk factors. Such a measure would reduce the incidence of ischemic heart disease, decreasing not only hospitalization but also mortality rates¹⁴.

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