

## Clinical evolution of patients hospitalized due to the first episode of Acute Coronary Syndrome<sup>1</sup>

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**Aim:** to assess the clinical evolution of patients hospitalized due to the first episode of Acute Coronary Syndrome (ACS) according to its clinical manifestation. **Methods:** data were collected from 234 patients, hospitalized between May 2006 and July 2009 due to the first episode of an ACS, by consulting their medical records. **Results:** 234 patients were hospitalized, 140 (59.8%) due to Acute Myocardial Infarction (AMI). In the group with AMI, 19.3% presented complications, against 12.8% in the group with Unstable Angina (UA) ( $p=0.19$ ). Angioplasty levels were higher among patients with AMI than with UA ( $p=0.02$ ) and coronary artery bypass graft surgery was more frequent among UA patients ( $p=0.03$ ). The majority (227; 97%) survived after the coronary event. Among the seven patients who died during the hospitalization, four had AMI (2.9%) and three UA (3.2%). **Conclusions:** A larger number of complications were found among infarction victims and the accomplishment of coronary artery bypass graft surgery differed between the groups.

**Descriptors:** Acute Coronary Syndrome; Clinical Evolution; Mortality; Nursing.

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## **Evolução clínica de pacientes internados em decorrência do primeiro episódio da Síndrome Coronariana Aguda**

Objetivo: avaliar a evolução clínica de pacientes internados pelo primeiro episódio da síndrome coronariana aguda (SCA), segundo sua manifestação clínica. Métodos: foram coletados dados de 234 pacientes internados entre maio de 2006 e julho de 2009, em decorrência do primeiro episódio de uma SCA, mediante consultas aos prontuários. Resultados: a maioria (59,8%) foi internada devido ao infarto agudo do miocárdio (IAM). No grupo com IAM, 19,3% apresentaram complicações e 12,8% no grupo com angina instável (AI) ( $p=0,19$ ). A realização de angioplastia foi maior entre os pacientes com IAM do que com AI ( $p=0,02$ ) e a cirurgia de revascularização foi mais realizada entre os pacientes com AI ( $p=0,03$ ). A maioria (227 - 97%) sobreviveu ao evento coronariano. Entre os sete pacientes que morreram na internação, quatro tinham IAM (2,9%) e três AI (3,2%). Conclusões: houve maior número de complicações entre os infartados e a realização de revascularização do miocárdio foi diferente nos dois grupos.

Descritores: Síndrome Coronariana Aguda; Evolução Clínica; Mortalidade; Enfermagem.

## **Evolución clínica de pacientes internados debido el primer episodio de la Síndrome Aguda de las Coronarias**

Objetivo: evaluar la evolución clínica de pacientes internados por el primer episodio del Síndrome Aguda de Coronarias según su manifestación clínica. Métodos: Fueron colectados datos de 234 pacientes internados entre mayo de 2006 y julio de 2009 debido el primer episodio de una ACA mediante consultas a los prontuarios. Resultados: La mayoría (59,8%) internó debido al Infarto Agudo del Miocardio (IAM). En el grupo con IAM, 19,3% presentaron complicaciones y 12,8% en el grupo con Angina Inestable (AI) ( $p=0,19$ ). La realización de angioplastia fue mayor entre los pacientes con IAM de lo que con AI ( $p=0,02$ ) y la cirugía de revascularización fue más realizada entre los pacientes con AI ( $p=0,03$ ). La mayoría (227; 97%) sobrevivió al evento de las coronarias. Entre los siete pacientes que murieron en la internación, cuatro tenían IAM (2,9%) y tres AI (3,2%). Conclusiones: Hubo mayor número de complicaciones entre los infartados y la realización de revascularización del miocardio fue diferente en los dos grupos.

Descriptores: Síndrome Coronario Agudo; Evolución Clínica; Mortalidad; Enfermería.

## **Introduction**

Cardiovascular illnesses (CI) are the main morbidity and mortality causes around the world, with increasing projections for the next decades. They were responsible for almost 30% of all deaths in 2004, reaching almost 32% of deaths among women and 27% among men<sup>(1)</sup>. In Brazil, records indicate concerns with the manifestation of CI at younger ages and alert to the accelerated growth of this pathology in the coming years due to population aging<sup>(2-3)</sup>. CI include ischemic diseases, particularly Acute Coronary Syndrome (ACS), which comprises Acute Myocardial Infarction (AMI – with

and without ST segment elevation) and Unstable Angina (UA)<sup>(4)</sup>. In 2009, 76,481 deaths associated with ACS were registered, considering only deaths by UA and AMI, which corresponds to 7% of all death and represents 24% of deaths due to diseases of the circulatory apparatus<sup>(5)</sup>. Since 1950, hospital mortality due to AMI has dropped, but DATASUS data still show a rate of 15%, considered high in comparison with the rate of 3.6% registered in North-American states in 2000<sup>(6)</sup>.

Downward mortality rates in recent years are linked with the introduction of new therapeutic modalities

in health, which resulted in reduced morbidity levels and permitted greater survival for cardiac patients, particularly myocardial reperfusion therapies and the development of new drugs. Despite significant advances, ACS still represents one of the most relevant public health issues nowadays.

The aim in this study was to assess patients' clinical evolution during hospitalization due to the first episode of ACS, considering the presence of complications, accomplishment of myocardial revascularization procedures and mortality, according to the clinical manifestation of the syndrome (AMI or UA).

## Methods

This descriptive and exploratory research was developed at a high-complexity public teaching hospital in the interior of São Paulo State, which mainly attends patients in the Unified Health System (SUS). The sample consisted of 234 patients hospitalized due to the first episode of ACS between May 2006 and July 2009 and who participated in an earlier study at the same institution<sup>(7)</sup>. The data presented in this research were collected through patient file consultations between February and August 2011. First, approval was obtained from the research institution's Ethics Committee to continue monitoring the patients who had participated in the previous study.

Data on the participants' sociodemographic characteristics were taken from the earlier study's database and are displayed in Table 1. For the clinical characteristics presented in this study, the researchers collected information from the 234 medical records with regard to: presence of preliminary cardiovascular comorbidities; hospitalization and discharge dates (for later calculation of hospitalization time), presence of complications during hospitalization (yes/no), accomplishment of myocardial revascularization procedures (chemical thrombolysis, Coronary Angioplasty

- CA e Coronary Artery Bypass Grafting - CABG) and dates of submission to revascularization procedures (for later calculation of waiting time for revascularization). The outcome variable of the hospitalization was ranked as death during hospitalization or discharge with outpatient monitoring (at the study hospital or transfer to another health service).

For data processing and statistical analysis, IBM *Statistical Package for the Social Sciences* (SPSS) software, version 20.0 was used. Descriptive simple frequency analyses were developed for nominal or categorical variables and central trend (mean and median) and dispersion (standard deviation) measures for continuous variables.

The Chi-square test was used to verify possible associations between the clinical manifestation of the ACS (UA or AMI) and the following variables: gender, age group, presence of complications and type of revascularization procedure (accomplishment of CA and accomplishment of CABG). Fisher's Exact test was applied to analyze a possible relation between the manifestation of the ACS and the first hospitalization outcome. Student's t-test was used to compare the duration of hospitalization with the mean times to accomplish the revascularization procedures, considering the clinical manifestation of the ACS. Significance was set at 5%.

## Results

Out of 234 patients hospitalized for the first time due to the manifestation of ACS, 140 (59.8%) were diagnosed with AMI and the remainder (94; 40.2%) with UA. Participants' sociodemographic characteristics are displayed in Table 1. Concerning the age group, the AMI group contained more patients of up to 59 years old (59.3%) than the UA group (50%), without statistical significance ( $p=0.16$ ). Men were predominant in both groups, with a statistically significant difference ( $p<0.001$ ) between the infarction (75.7%) and the UA group (59.6%).

Table 1 – Sociodemographic characteristics of 234 subjects during initial hospitalization, considering age, gender, education, marital situation and remunerated job, according to clinical manifestation of Acute Coronary Syndrome. Ribeirão Preto, SP, Brazil, 2006–2009

Variable	Total sample (n=234)	AMI (n=140)	UA (n=94)
Age			
Mean (SD)	58.0 (12.2)	56.4 (12.7)	60.5 (10.9)
Median (Min. - Max.)	58.6 (25.4 – 82.2)	58.2 (25.4 – 79.4)	60.8 (25.4 – 82.2)
Up to 59 years	55.6 % (130)	59.3% (83)	50.0% (47)
60 years or more	44.4 % (104)	40.7% (57)	50.0% (47)

(continue...)

Table 1 - (continuation)

Variable	Total sample (n=234)	AMI (n=140)	UA (n=94)
Male gender % (n)	69.2% (162)	75.7% (106)	59.6% (56)
Education (years)			
Mean (SD)	5.3 (4.2)	5.4 (4.1)	5.0 (4.2)
Median (Min. - Max.)	4.0 (0 - 23)	4.0 (0 - 23)	4.0 (0 - 21)
Marital situation % (n)			
Married	70.5% (165)	69.3% (97)	72.3% (68)
Separated/widowed/single	29.5% (69)	30.7 (43)	27.7% (26)
Paid job % (n)	59.0% (138)	64.3% (90)	51.1% (48)

Among infarction and UA victims, the most frequent cardiovascular comorbidities before the hospitalization were: arterial hypertension (62.9% and 80.9%, respectively); obesity/overweight (61.5% and 60.6%), dyslipidemias (34.3% and 52.1%) and diabetes (28.6% and 43.6%). On average, patients were hospitalized for 11 days (SD=11.2; range from two to 71). When comparing the mean hospitalization times, the duration was longer in the UA (Mean=12.5; SD=13.4) than in the AMI group (Mean =10. SD=9.2), but this difference was not statistically significant ( $p=0.12$ ) (Table 2). Thirty-nine (16.7%) patients presented some kind of complication during the first hospitalization. In the group of 140 patients with AMI, there were more patients with complications (19.3%) than in the group of 94 UA patients (12.8%). The association test among the variables, ACS manifestation and presence of complications during the first hospitalization showed no statistically significant result though ( $p=0.19$ ). The most frequent complications registered in the participants' medical records were reversed cardiac arrest (21; 35.6%), cardiac arrhythmias like fibrillation and atrial flutter (12; 20.3%) and complications related to myocardial

revascularization procedures (CA and CABG), including pseudo-aneurysm (3; 5.1%), catheter puncture site infection (3; 5.1%), arterial laceration (2; 3.4%) and surgical wound dehiscence/infection (2; 3.4%). Some patients presented more than one complication during the study period.

Concerning the results about the myocardial revascularization procedures the patients hospitalized due to the first episode of ACS were submitted to, chemical thrombolysis was performed in 64 patients (44.3% out of 140 infarction victims) who were diagnosed with AMI with ST segment elevation. When considering all 234 patients, 134 (57.3%) were submitted to CA and only 25 (10.7%) to CABG. CA was more frequent among AMI than UA patients ( $p=0.02$ ), while CABG was more frequently accomplished among UA than among infarction patients ( $p=0.03$ ) (Table 3). The time between the hospitalization and the accomplishment of the myocardial revascularization procedure was also compared between the groups. More time passed to accomplish the CABG than the CA, but the difference between these ACS modalities was not statistically significant (Table 2).

Table 2 - Comparison between duration of first hospitalization due to ACS and mean times to accomplish revascularization procedures (Coronary Angioplasty - CA and Coronary Artery Bypass Graft - CABG), according to clinical manifestation of the syndrome. Ribeirão Preto, SP, Brazil, 2006–2009

Variable	Total sample	AMI	UA	p value*
Days of hospitalization	n=234	n=140	n=94	0.12
Mean (SD)	11.0 (11.2)	10.0 (9.2)	12.5 (13.4)	
Median (Min. - Max.)	8.0 (2 - 71)	7.0 (2 - 61)	8.0 (2 - 71)	
Time until AC (days)	n=134	n=89	n=45	0.52
Mean (SD)	2.9 (4.8)	3.0 (5.1)	2.5 (4.1)	
Median (Min. - Max.)	0 (0 - 29)	0 (0 - 29)	0 (0 - 17)	
Time until CABG (days)	n=25	n=10	n=15	0.31
Mean (SD)	25.7 (9.7)	28.3 (11.1)	24.0 (8.5)	
Median (Min. - Max.)	24.0 (13 - 53)	29.0 (13 - 53)	23.0 (13 - 43)	

\*Student's T test

When investigating the outcome of the first hospitalization, out of 234 patients, 227 (97%) had survived the coronary event and seven (3%) died during hospitalization (Table 3). Survivors were forwarded for outpatient monitoring at the same hospital service or other health units. Among the seven patients who died in the same period, four had been victims of AMI, corresponding to 2.9% of all infarction victims, and three had been diagnosed with IA, corresponding to 3.2% in this group. For six of them, the cause of death was directly related to the CI. None of the seven patients was submitted to CA and five to CABG, characterizing a post-CABG mortality rate of 20%. The mean time between hospitalization and surgery was 20 days. It should be highlighted that the mean time between the surgery and death was four days (one patient died in surgery; three on the third postoperative day and one after 11 days). Days before they died, five out of seven patients presented cardiac arrhythmia, reversed cardiac arrest, nosocomial pneumonia and coagulation defects following extracorporeal circulation.

Table 3 - Results of association test among the variables clinical manifestation of ACS, type of revascularization procedure (CA and CABG) and discharge outcome of first hospitalization due to ACS. Ribeirão Preto, SP, Brazil, 2006–2009

Variables	AMI n = 140 % (n)	UA n = 94 % (n)	p value
Accomplishment of CA			0.02*
Yes	63.6% (89)	47.9% (45)	
No	36.4% (51)	52.1% (49)	
Accomplishment of CABG			0.03*
Yes	7.1% (10)	16.0% (15)	
No	92.9% (130)	84.0% (79)	
Outcome first hospitalization			0.58†
Discharge outpatient monitoring	97.1% (136)	96.8% (91)	
Death	2.9% (4)	3.2% (3)	

\*Chi-square test and †Fisher's Exact Test

## Discussion

The aim in this study was to assess the clinical evolution of 234 hospitalized patients due to the first episode of ACS, considering the presence of complications, accomplishment of myocardial revascularization procedures (chemical thrombolysis, CA and CABG) and hospitalization outcome (death or discharge for outpatient monitoring), according to the clinical manifestation of the syndrome (AMI or IA).

The participants' characteristics regarding the predominance of male and elderly patients is similar to other studies of cardiac patients<sup>(8-10)</sup>. These variables are strongly associated with coronary patients' clinical evolution and mortality due to ACS.

When considering the clinical manifestation of the CSA, the most common diagnosis was AMI (59.8%). This proposal reflects the ACS pattern found in other studies<sup>(10-11)</sup>, but differs from other populations that presented UA as the most frequent cause of hospitalizations<sup>(12-14)</sup>. As the institution is a tertiary service, this may have influenced the result, due to the preliminary selection deriving from the medical regulation process in the local network.

The patient's mean hospitalization time was 12.5 days for the group with UA and 10 days for the group with AMI. These means were higher than in other international studies, considering cases of UA (mean 8.3 days), but similar to patients with AMI (mean 9.7 days)<sup>(12)</sup>. The obtained result was also higher than in Brazilian studies<sup>(14-16)</sup>. In this context, other studies are due to evaluate whether the long stay at the study institution is due to the attended patients' clinical evolution, the therapeutic conduct or organizational and structural problems, such as examination scheduling, human and material resources, which are contributing to the patients' longer hospital stay. Intuitively, we may suggest that the longer time can partially derive from the presence of medical regulation in the forwarding system as, according to the existent patient ranking, cases of patients with more severe clinical manifestations tend to be forwarded to the study institution. One aspect that underlines this hypothesis is the large number of cardiac arrests in our sample.

Complications mainly affected infarction victims, with cardiac arrest and cardiac arrhythmias as the most frequent ones (fibrillation and atrial flutter). In other studies, the results showed that 67.1% of participants presented complications, 14.8% of which were related to the cardiac rhythm<sup>(10)</sup>, while the occurrence of fibrillation or atrial flutter corresponded to 8% among infarction victims and 5% among UA patients<sup>(8)</sup>.

Concerning the revascularization procedures, other researchers<sup>(12)</sup> obtained similar proportions of patients submitted to thrombolysis. Results from a Brazilian study showed that chemical revascularization is used more frequently (3.8 times more) in public than in private hospitals, which prioritized the use of primary CA in cases of AMI with ST segment leveling<sup>(10)</sup>. The use of thrombolytic drugs should be encouraged, as this

low-cost therapeutic resource of easy access effectively reduces AMI-related mortality<sup>(10)</sup>, notably when CA is not available.

In this study, 57.3% of the 234 participants were submitted to CA and only 10.7% to CABG. CA levels were higher among AMI than UA patients ( $p=0.02$ ), while CABG was more frequent among UA than among infarction victims ( $p=0.03$ ).

As observed in other studies, frequently, infarction patients are more submitted to revascularization procedures (CA or CABG) than UA patients<sup>(11,14,17)</sup>. The international studies GRACE<sup>(11)</sup> and ENACT<sup>(12)</sup> identified higher levels of CA at teaching hospitals, which is the case of the present study hospital. A Brazilian study, on the other hand, discovered that revascularization procedures are more frequent at private than at public hospitals, in all ACS diagnostic classes. The results surprisingly appointed that, although private hospitals performed almost all CA and CABG, no significant difference in mortality rates was found between the hospitals, arousing reflections on the use of invasive procedures in ACS<sup>(10)</sup>.

Concerning the survival of patients hospitalized due to the first clinical manifestation of ACS, the hospital mortality rate was equivalent to the rates in European countries like the United Kingdom and Belgium<sup>(8)</sup>. Data from the GRACE<sup>(11)</sup> study appoint rates between 7% and 6% for AMI and 3% for UA. In the same study, the Argentina/Brazil region showed hospital mortality rates of 12% for AMI and 4% for UA, much higher than the rates in the other study regions. As for Brazilian data, mortality rates were similar to cardiologic referral centers<sup>(14,17)</sup> and lower than in general hospitals<sup>(10,18)</sup>. These findings suggest that ACS treatment at the study hospital has been accomplished efficiently, with mortality rates similar to reference records. Hospital mortality after CABG, on the other hand, was 20% higher than in other institutions<sup>(13,16,19-20)</sup>. A Brazilian nationwide study identified a rate of 7.2%<sup>(21)</sup>. In Rio de Janeiro, adjusted mortality levels at the research hospitals ranged between 1.9% and 11.2%<sup>(19)</sup>. In another study, 30-day mortality among patients submitted to CABG equaled 6.4%<sup>(16)</sup>. Researchers observed that, while general hospital mortality rates corresponded to 10.9% after the CABG, 13.7% was found at a state-owned teaching hospital and 14.3% at a federal teaching hospital. At two specialized hospitals in cardiology care, rates were almost 50% lower (7% and 7.4%)<sup>(13)</sup>. Further research is needed to verify this inequality.

Finally, the use of secondary data (medical records) and the lack of patients' risk stratification in the determination of the mortality rate are highlighted as study limitations. Health professionals' heterogeneous records in patients' medical records hampered data collection and even made it impossible to collect other data, which would be important in any studies that intend to evaluate these patients' clinical evolution.

## Conclusion

When comparing the clinical evolution of the 234 patients hospitalized due to the first episode of ACS according to the clinical manifestation of the disease (UA or AMI), we found more frequent complications among AMI patients. The accomplishment of coronary artery bypass graft procedures differed between both groups. CA was more frequent among AMI patients and CABG among UA patients. The observed mortality level was lower than in other studies.

The present research results are important for health professionals in general, and particularly for those active in care delivery to ACS patients. They enhance knowledge on the profile of this patient group attended due to the first episode of ACS at a tertiary general hospital, as well as about the clinical evolution between hospitalization and discharge.

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