Advances in Medicine and Engineering Interdisciplinary Research, 2025, Volume 3, Issue 2
DOI: 10.32629/ameir.v3i2.3793
ISSN Online: 2972-3825
ISSN Print: 2972-3833

Tendencies of Acute Coronary Syndrome in the Clinical Surgical University Hospital Comandante Faustino Perez Hernandez

Alberto de Jesús Montero-Jimeno*, Yasmil Diéguez-Cívico

Hospital Universitario Clínico Quirúrgico Comandante Faustino Pérez Hernández, Matanzas, Cuba.
*Corresponding author. Email address: albertojm.mtz@infomed.sld.cu

Abstract: Introduction: Acute coronary syndromes represent the acute form of ischemic heart disease. In Cuba, it is the first cause of death in recent years. The province of Matanzas shows similar behavior. Objective: To evaluate morbidity and lethality tendencies of the patients with acute coronary syndrome in a period of five years. Materials and methods: A descriptive, retrospective, cross-sectional study was carried out with 734 patients admitted with acute coronary syndrome in the Emergency Intensive Care Unit of the Clinical Surgical University Hospital Comandante Faustino Perez, of Matanzas, between January 2016 and December 2020. The patients were characterized according to clinical variables. The data were extracted from clinical records. The Chi-square test was applied. Results: There was a progressive and continuous decrease of the total of patients with acute coronary syndrome in the studied five years. Male gender accounted for 53.67% ($p < 0.02$). The most affected age group was the 60-69 years one. The acute coronary syndrome without ST segment elevation prevailed in four of the analyzed years. The establishment of the thrombolytic treatment prevailed in 78.75% of the patients with ST segment elevated acute coronary syndrome. The total of deaths decreased in the studied period. The importance of thrombolysis application was demonstrated. Conclusions: The total of patients with diagnosis of acute coronary syndrome and lethality due to this cause gradually decreased in the studied five-year period in the Emergency Intensive Care Unit of the Clinical Surgical Hospital Comandante Faustino Perez Hernandez, of Matanzas.

Key words: acute coronary syndrome; acute myocardial infarction; ST segment elevation; thrombolysis; lethality

1. Introduction

Cardiovascular diseases are responsible for one-third of deaths worldwide: approximately 17.5 million people die each year from this cause. Every two seconds, someone dies from cardiovascular disease, and every five seconds, an acute myocardial infarction (AMI), according to data from the World Health Organization. [1]

Ischemic heart disease presents in different forms: on the one hand, there are acute coronary syndromes (ACS), which, as their name suggests, represent the acute or exacerbated form of ischemic heart disease. These acute coronary syndromes are further subdivided into ACS with or without ST-segment elevation, based on electrocardiographic findings. [2]

ACS is generally due to the rupture or erosion of an atherosclerotic plaque and the subsequent formation of a thrombus that completely or partially obstructs the involved coronary artery. [3]

1.1 Pathophysiology

ACS is precipitated by the onset of acute thrombosis, induced by the rupture or erosion of an atherosclerotic plaque, with or without concomitant vasoconstriction, which produces a sudden and critical reduction in blood flow.

Plaque rupture exposes atherogenic substances that can produce a large thrombus in the infarct-related artery. An adequate collateral network that prevents necrosis can lead to asymptomatic episodes of coronary occlusion. Completely occlusive thrombi characteristically produce a transparietal lesion of the ventricular wall in the myocardial bed supplied by the affected coronary artery, and often produce ST-segment elevation on the electrocardiogram.

Inflammation has been shown to be a key pathophysiological element in the complex process of plaque rupture. In sporadic cases, ACS may have a non-atherosclerotic etiology, such as arteritis, trauma, dissection, thromboembolism, congenital anomalies, cocaine addiction, and complications of cardiac catheterization. [4]

Acute coronary syndromes account for one-third of deaths in people over 35 years of age worldwide. [2] It is estimated that 600,000 AMIs occur each year in the United States, of which 25% present with a silent clinical profile, and 320,000 as episodes of exacerbation of ischemic heart disease (AMI and acute unstable angina). Of all AMIs that occur annually in that country, the mortality rate is reported at approximately 25%. Therefore, coronary heart disease remains the leading cause of death in developed countries. [5] In a 2016 circular, the American Heart Association states that 15.5 million people aged 20 and over in the United States have coronary heart disease, equivalent to 4.8% of the estimated population for that year, according to the World Bank. [6]

In Cuba, in 2016, heart disease was the leading cause of death, with a total of 24,462 deaths, of which 66.05% were due to ischemic diseases, and of these, 44.42% were due to acute myocardial infarction. The provinces with the highest incidence were Havana, Santiago de Cuba, Matanzas, Holguín, and Villa Clara. [5] In 2017, there were a total of 7,998 deaths from acute myocardial infarction in Cuba, and in 2018, 7,350 deaths from the same cause. [7] The province of Matanzas, for its part, shows a similar trend. In 2018, 379 deaths were reported, and in 2019, 393 deaths from this cause (data obtained from the provincial Department of Medical Records and Health Statistics).

The scientific problem motivating this research is to understand how acute coronary syndrome has affected the health status of the Matanzas population over a five-year period. This study was proposed considering the national and provincial morbidity of ischemic heart disease, and within it, acute coronary syndromes. The objective of this study is to evaluate morbidity and mortality trends in patients diagnosed with ACS treated in the Emergency Intensive Care Unit of the Comandante Faustino Pérez Hernández Clinical and Surgical University Hospital in the province of Matanzas.

2. Materials and Methods

A retrospective, cross-sectional, descriptive study was conducted with patients admitted to the Emergency Intensive Care Unit (EICU) of the Comandante Faustino Pérez Hernández Clinical and Surgical University Hospital in the province of Matanzas, with a diagnosis of ACS, between January 1, 2016, and December 31, 2020. During this period, 734 patients with a clinical and electrocardiographic diagnosis of ACS were admitted to the EICU.

- During the investigation, the fourth universal definition of AMI, issued by the European Society of Cardiology in 2019, was considered as an update:
- ST-segment elevation acute coronary syndrome (STE-ACS) is defined as: ST-segment elevation at the J point in two contiguous leads with the following cutoff points:
- ≥ 0.1 mV in all leads (except V2-V3).
- In V2-V3, cutoff points are: ≥0.2 mV in men aged >40 years, ≥0.25 mV in men aged <40 years, and ≥0.15 mV in women.

- Non-ST-segment elevation acute coronary syndrome (NSTE-ACS) is defined as: it does not show the abnormalities described for ST-ACS.

The patient presents ST/T segment abnormalities consistent with:

- New horizontal or downward-sloping ST-segment depression ≥ 0.05 mV in two contiguous leads.
- T-wave inversion ≥ 0.1 mV in two contiguous leads with a prominent R wave or an R/S ratio > 1.

The criteria for thrombolytic therapy (preferably within 30 minutes and never after 60 minutes after these patients' arrival at the hospital) were:

- New ST-segment elevation greater than 1 mm (0.1 mV) in two or more contiguous leads: in leads V2-V3 > 2 mm (0.2 mV) in men and > 1.5 mm (0.15 mV) in women.
- New left bundle branch block (LBBB) and a history suggestive of AMI.
- ST-segment depression in V1-V4 and a history suggestive of AMI that may correspond to an inferobasal (posterior) AMI. [4]

NSTE-ACS consisted of non-Q-segment AMI and acute unstable angina. [2] Coronary reperfusion in NSTE-ACS is primarily achieved through pharmacological thrombolysis.

Contraindications for the use of fibrinolytic drugs are as follows:

- Absolute: hemorrhagic stroke, ischemic stroke (< 6 months), closed head trauma in the last three months or brain tumor, known coagulation disorder, aortic dissection, non-compressible puncture (lumbar, hepatic).
- Relative complications: transient ischemic attack (< 6 months), dicoumarol therapy, pregnancy, severe liver disease, infective endocarditis, active peptic ulcer, prolonged cardiopulmonary resuscitation, previous exposure (between 5 days and 6 months) to recombinant streptokinase (RSK), or a previous allergic reaction.

Regarding complications, hemorrhagic stroke is the most serious and feared; its frequency is around 0.5 - 1%. Key predictive factors include age, low weight, female sex, a history of stroke, and high blood pressure. Severe extracranial hemorrhage occurs with a frequency of between 4% and 13%. This study used domestically produced recombinant streptokinase, which is the institutionalized product in the country and has proven results.

Treatment regimen:

SKR (heberkinase): 1,500,000 IU in 100 ml of 0.9% saline or 5% dextrose, to be administered over 30-60 minutes through a peripheral vein, preferably using an infusion pump.

Preparation: Instill the solvent water (5 cc) slowly through the walls of the bulb and swirl gently until dissolved. Slowly introduce the dissolved medication into the infusion bottle. This should be done to avoid the formation of bubbles. [4]

Definition of variables: (Clinical)

- Age (discrete quantitative): Age was considered in years.
- Sex (dichotomous nominal qualitative): male and female.
- History of acute myocardial infarction or angina (dichotomous nominal qualitative): based on the patient's reported history.
- Hospital case fatality: defined as the number of patients who died from STEMI among the total number of patients with the same condition in the first seven days of hospitalization. It is expressed as a percentage.
- Data collection technique: The necessary information was obtained from the medical records and the ICU patient registry.

The processing and analysis technique was the chi-square test, for which a statistical significance level of $p < 0.05$

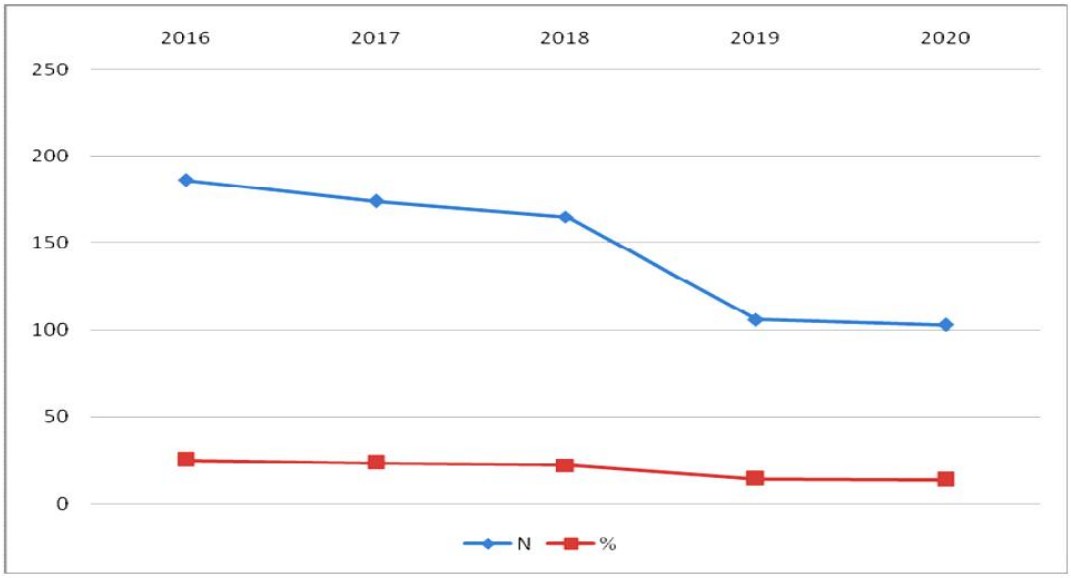
was accepted. Statistical processing was performed using SPSS v15.0 for Windows.

The research respected the confidentiality of the information obtained, which will be used only for scientific purposes. The study constitutes a research project. It was approved by the hospital's Scientific Council and Research Ethics Committee. It was conducted in accordance with the principles of the Declaration of Helsinki.

3. Results

The initial analysis of this study shows that a total of 734 patients were admitted between January 2016 and December 2020, all diagnosed with acute coronary syndrome. The trend in total admissions to the ICU was downward during the five-year period studied, with a continuous downward curve observed. (Graph)

Graph: Acute coronary syndrome trends in the ICU (2016-2020)



According to the demographic variable (sex), a slight predominance of males (394 patients) was observed over females, representing 53.67% of the study sample ($p < 0.02$). Therefore, there was a significant statistical association in this regard. (Table 1)

Table 1. Sex distribution of patients admitted with ACS to the ICU (2016-2020)

Years	Female		Male		Total	
	No.	%	No.	%	No.	%
2016	88	25.88	98	24.87	186	25.34
2017	79	23.23	95	24.11	174	23.70
2018	72	21.17	93	23.60	165	22.47
2019	51	15	55	13.95	106	14.44
2020	50	14.70	53	13.45	103	14.03
Total	340	99.98	394	99.98	734	99.98

Table 2 shows the presentation of acute coronary syndrome and its relationship with different age groups. The most affected age group was 60 to 69 years, with 254 patients ($p < 0.005$), demonstrating a significant association. Furthermore, the higher number of male patients in this age group is confirmed. To a lesser extent, patients between 30 and 39 years of age were detected.

Table 2. Age distribution of patients with ACS admitted to the ICU (2016-2020)

Age groups	Female		Male		Total	
	No.	%	No.	%		
30-39	1	0.29	3	0.76	4	0.54
40-49	4	1.17	9	2.28	13	1.77
50-59	61	17.94	78	19.79	139	18.94
60-69	126	37.05	128	32.48	254	34.60
70-79	87	25.58	98	24.87	185	25.20
80-89	54	15.88	69	17.52	123	16.75
>90	7	2.07	9	2.28	16	2.17
Total	340	99.98	394	99.98	734	99.98

Table 3 and Table 4 show the types of ACS according to their classification, based on ST-segment elevation or not. A predominance of NSTE-ACS was evident in the four years analyzed. Men were more affected than women among the total number of patients diagnosed with NSTE-ACS in the years analyzed, except in 2019, where there was a slight predominance of women. Males predominated over females in patients diagnosed with NSTE-ACS in all years studied.

Table 3. Classification of coronary syndrome in patients admitted to the ICU (2016-2017)

Coronary syndrome	2016			2017		
	F	M	T	F	M	T
NSTE-ACS	38	49	87	39	41	80
NSTE-ACS	41	58	99	40	54	94
Total	79	107	186	79	95	174

F = female; M = male; T = total.

Table 4. Classification of coronary syndrome in patients admitted to the ICU (2018-2020)

Coronary syndrome	2018			2019			2020		
	F	M	T	F	M	T	F	M	T
NSTE-ACS	37	42	79	25	33	58	22	27	49
NSTE-ACS	41	45	86	26	22	48	23	31	54
Total	78	87	165	51	55	106	45	58	103

F = female; M = male; T = total.

Regarding the use of thrombolytic therapy, during the five-year period under study, the majority of patients diagnosed with STE-ACS received thrombolysis. This number accounted for 78.75%, surpassing the number of non-thrombin-treated patients, who represented 21.24%. For the diagnosis of STE-ACS, as well as for the decision to administer thrombolysis, the criteria previously mentioned in the Materials and Methods section were taken into account (Table 5).

Table 5. Application of thrombolysis in patients treated with STE-ACS in the ICU (2016-2020)

Years	Thrombolized		Non-thrombolyzed		Total	
	No.	%	No.	%	No.	%
2016	65	23.38	22	29.33	87	24.64

Years	Thrombolized		Non-thrombolyzed		Total	
	No.	%	No.	%	No.	%
2017	63	22.66	17	22.66	80	22.66
2018	73	26.25	6	8	79	22.37
2019	39	14.02	19	25.33	58	16.43
2020	38	13.66	11	14.66	49	13.88
Total	278	99.98	75	99.98	353	99.98

Finally, Table 6 represents the case fatality rate for patients admitted to the ICU. This refers only to patients diagnosed with NSTE-ACS. It reflects the progressive decrease in the total number of deaths. The data are related to the high percentage of patients who received thrombolytic treatment, which allowed them to recanalize the obstructed vessel and thus prevent fatal complications in these patients. In 2016, there were 9 deaths from this cause, and at the end of the five-year period (2020), only 3 deaths were reported. Males again predominated in this aspect evaluated. The case fatality rate of patients with NSTE-ACS was not evaluated in this section of the study because there were no deaths in this group of patients in the ICU.

Table 6. Case fatality rate of patients with NSTE-ACS in the ICU (2016-2020)

Years	Total number of patients admitted	NSTE-ACS deaths			% lethality
		Total	F	M	
2016	186	9	3	6	4.89
2017	174	9	4	5	4.83
2018	165	7	2	5	4.24
2019	106	4	1	3	3.77
2020	103	3	-	3	2.91

F = female; M = male.

3. Discussion

This study observed a progressive reduction in the total number of patients admitted to the ICU of the Comandante Faustino Pérez Hernández Clinical and Surgical University Hospital in Matanzas over the five-year period covered. In the authors' opinion, this decrease is the result of two factors: rapid and safe access to health services provided by the provincial hospital and the adoption of healthier lifestyles among the Matanzas population.

Men were the most affected in the series of cases analyzed. This finding is consistent with studies conducted by Clemente López et al. [8] and Kiuchi. [9] Men also outnumbered women in the study by Chi et al. [10] The protection provided by estrogens to women in the premenopausal age group is decisive in these results.

The 60-69 age group stood out in the study with the highest number of patients; The same was described by Clemente López et al. [8] and Bouisset; [11] It also coincides with what was reported in the study by Cruz Rodríguez et al. [12] This finding does not coincide with what Poll Pineda et al. [13] found, who described the 45 to 64 age group as the most affected. This age range, which the authors were able to report, is related to the life expectancy achieved by the Cuban population, thanks to the health policies outlined by the government, among which the primary role played by population dispensation in primary health care stands out. Age strongly predicts coronary artery disease, with clinically significant atherosclerosis being rare before the age of 40.

The authors demonstrated the prevalence of NSTE-ACS over four years in the case series studied; the year 2019 is an exception, as it was only slightly prevalent. Over the past three decades, a precipitous decline in the incidence of STE-ACS and a reciprocal increase in NSTE-ACS have been observed. [14] Their research reflects the predominance of patients with NSTE-ACS, as well as the study by researchers at the Comandante Manuel Fajardo Clinical and Surgical Teaching Hospital in Havana. [14] These results do not agree with the article published by Dávila-Cervantes 17 in Mexico, where STE-ACS predominated. The authors believe that the predominance of STE-ACS diagnoses in the aforementioned year may be due to a fragmented history, associated with an incomplete physical examination at the time of admission to the IECU, which led to this result.

In the study, thrombolytic therapy was administered to 78.75% of patients with STE-ACS admitted to the IECU. This result is consistent with that of Torres, [18] who described the application of the fibrinolytic agent streptokinase within the first hours of pain onset in 72.9% of patients. Several authors believe this is the treatment of choice in the first few hours to achieve recanalization of the obstructed vessel and reduce the extent of damage to the heart muscle, ensuring improved survival and quality of life. [6] The authors of this study believe that when thrombolytic treatment is not administered within the established timeframe, and in association with other factors such as age and sex, there may be an increase in mortality from STE-ACS.

Case fatality rates in the ICU remained very similar to those of the international studies reviewed. Knowledge of case fatality tells us how serious a disease is. This study reflected a progressive decrease in case fatality rates in the ICU over the five years studied. The research is consistent with the results reported by Kiuchi [9] in the Kanfuzen Study. In the authors' opinion, this decrease in case fatality rates is explained by several factors, including improved healthcare care and greater public awareness of acute chest pain and its complications, which shortens the time from the onset of pain to the start of treatment in a health center. Also worth mentioning is the immediacy of calls from the public to the province's Integrated Emergency Medical System, and the timely implementation of thrombolysis in the hospital's ICU.

The number of patients with ACS and case fatality rates from this cause gradually decreased during the five-year period studied in the ICU of the Comandante Faustino Pérez Hernández Clinical and Surgical University Hospital. More prospective studies are needed to assess long-term trends in ACS. This will allow for the development of new policies for the prevention and control of this condition.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Enamorado A, Goro G, García-Cañete I, et al. Caracterización clínica y epidemiológica de pacientes con Infarto Agudo del Miocardio con elevación del segmento ST. Panorama Cuba y Salud [Internet]. 2020;15(3). Disponible en: http://www.revpanorama.sld.cu/index.php/panorama/article/view/1260

[2] Leiva Murillo E. Caracterización del síndrome coronario agudo en pacientes mayores de 18 años atendidos por el servicio de Cardiología del Hospital San Juan de Dios Estelí, durante el período enero-diciembre 2019 [tesis en Internet]. Managua: Universidad Nacional Autónoma de Nicaragua; 2020. Disponible en: https://repositorio.unan.edu.ni/13678

[3] Reyes Hernández LM, Correa Morales AM, Toledo Pérez Y, et al. Enfoque clínico y epidemiológico del síndrome coronario agudo, una experiencia. Acta Médica del Centro [Internet]. 2019;13(1):3-11. Disponible en: http://www.revactamedicacentro.sld.cu/index.php/amc/article/view/917/1255

[4] Coll-Muñoz Y, Valladares-Carvajal F, González-Rodríguez C. Infarto agudo de miocardio. Actualización de la Guía de Práctica Clínica. Finlay [Internet]. 2016;6(2). Disponible en:

http://www.revfinlay.sld.cu/index.php/finlay/article/view/403

[5] Plain Pazos C, Pérez de Alejo Alemán A, Carmona Pentón CR, et al. Comportamiento del infarto agudo de miocardio en pacientes hospitalizados. Rev Cubana Med Int Emerg [Internet]. 2019;18(2):1-14. Disponible en: https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=89213

[6] Gaviria S, Ramírez A, Alzate M, et al. Epidemiología del síndrome coronario agudo. Medicine UPB. 2020;39(1):49. DOI: 10.18566/medupb.v39n1.a08

[7] Ministerio de Salud Pública. Dirección Nacional de Estadísticas. Anuario estadístico de salud 2018 [Internet]. La Habana: MINSAP; 2019. Disponible en: http://files.sld.cu/bvscuba/files/2019/04/Anuario-Electronico-Espanol-2018-ed-2019.pdf

[8] Clemente López F J, Rodríguez Móndejar JJ, Rodríguez Gómez JA. Factores que favorecen el reingreso en intensivos de pacientes con síndrome coronario agudo. Enferm Glob [Internet]. 2018;17(52):36-63. Disponible en: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412018000400036&lng=es

[9] Kiuchi K, Obayashi K, Ishikawe T, et al. Five-year long-term outcomes of acute coronary syndrome with general practitioner-based management: myocardial infarction cohort study by Kanfuzen study (MIC-K) study. J Jpn Coron Assoc [Internet]. 2017;23(4):230-7. Disponible en: https://www.jstage.jst.go.jp/article/jcoron/23/4/23_23.17-00014/_article/-char/ja/

[10] Chi GC, Kanter MH, Li BH, et al. Trends in acute myocardial infarction by race and ethnicity. J Am Heart Assoc [Internet]. 2020;9(5):e013542. Disponible en: https://www.ahajournals.org/doi/full/10.1161/JAHA.119.013542

[11] Bouisset F. La revascularisation du patient coronarien stable. Arch Mal Coeur Vaiss Prat [Internet]. 2020 Sep;(290):7-10. Disponible en: http://doi.org/10.1016/j.amcp.2020.06.005

[12] Cruz Rodríguez LO, Gato Ramos RM, Ravelo Dopico R, et al. Caracterización del síndrome coronario agudo en mujeres. Corsalud [Internet]. 2020;12(4):372-82. Disponible en: http://www.revcorsalud.sld.cu/index.php/cors/article/view/498

[13] Poll Pineda JA, Rueda Macías NM, Poll Rueda A, et al. Caracterización clinicoepidemiológica de pacientes con síndrome coronario agudo según sexo. Medisan [Internet]. 2017 Oct;21(10):3003-10. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1029-30192017001000002&lng=es

[14] Ávila Cabreja JA, Fonseca Marrero CA, De la Torre Fonseca LM. Factores de riesgo asociados a las variantes clínicas del síndrome coronario agudo. Rev Cubana Med [Internet]. Sep 2021 [citado 20/04/2022];60(3):e1364. Disponible en: Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75232021000300008&lng=es

[15] Neumann JT, Goßling A, Sörensen NA, et al. Temporal trends in incidence and outcome of acute coronary syndrome. Clin Res Cardiol. 2020;109(9):1186-92. Citado en PubMed; PMID: 32034482

[16] Liu R, Sun YQ, Hou XX, et al. Temporal trends in diagnosis, treatment, and outcome for non-ST-segment elevation acute coronary syndrome in three regions of China, 2008-2015. Chin Med J. 2021;134(16):1997-9. Citado en PubMed; PMID: 34387613

[17] Dávila-Cervantes C. Tendencia e impacto de la mortalidad por enfermedades cardiovasculares en México, 1990-2015. Rev Cubana Sal Pública [Internet]. 2020;45(4) Disponible en: Disponible en: http://www.revsaludpublica.sld.cu/index.php/spu/article/view/1081

[18] Torres F. Fibrinolíticos en el infarto agudo de miocardio. Análisis de una cohorte uruguaya en un período de cuatro años. Rev Urug Cardiol [Internet]. 2017 Montevideo ago;32(2):121-31. Disponible en: http://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-04202017000200121&lng=es