CorSalud 2017 Jul-Sep;9(3):155-162

CorSalud

Cuban Society of Cardiology

Original Article

Cardiocentro Ernesto Che Guevara Santa Clara Cuba

Diagnosis of sudden death at the «Hospital Dr. Agostinho Neto» in Guantánamo, Cuba

Irayma Cazull Imbert[1]✉, PhD; Raúl Hernández Heredia[2] , PhD; and Abel Creagh Cazull[3], MD

[1] Department of Pathological Anatomy. Hospital General Docente Dr. Agostinho Neto. Guantánamo, Cuba.
[2] University of Guantánamo. Guantánamo, Cuba.
[3] University of Medical Sciences of Guantánamo. Guantánamo, Cuba.

Este artículo también está disponible en español

ARTICLE INFORMATION

Received: April 18, 2017
Accepted: May 18, 2017

Competing interests
The authors declare no competing interests

Abreviaturas
EICU: Emergency intensive care unit
SCD: Sudden cardiac death
SD: Sudden death

Versiones *On-Line*:
Español - Inglés

✉ *I Cazull Imbert*
Luz Caballero Nº 1409 e/ 4 y 5 Sur.
Guantánamo, Cuba.
E-mail address:
icazull@infosol.gtm.sld.cu

ABSTRACT

Introduction: The diagnosis of sudden death represents a challenge for health systems worldwide.
Objective: To assess trends in the diagnosis of sudden death.
Method: Cross-sectional, retrospective and correlational study in 58 cases diagnosed with sudden death who were performed an autopsy at the Hospital Agostinho Neto of Guantánamo, Cuba, in 2015.
Results: Deceased patients with the above mentioned diagnosis predominated, males (56.9%) at the out-of-hospital setting (55.2%) and due to non-ischemic causes (58.6%). In 51.6%, the diagnosis was not issued as stated in the international nomenclature. The 90% of the sudden cardiac ischemic deaths was produced by acute myocardial infarction and in 88.2% of the non-ischemic cases, global cardiomegaly was observed with hypertrophy or dilatation, or both, of the cardiac cavities. A correlation between the corrected and direct causes of death was found, as well as between the intermediate and basic ones.
Conclusions: The out-of-hospital sudden death prevailed. There was no demonstrated the correlation between the place of death, the age groups and sex with the basic and direct causes of death, but there was an actual relationship between the direct cause of original death and the corrected one, denoting that the sudden death diagnosis was not stated as in the international nomenclature.
Key words: Sudden death, Sudden cardiac death, Cause of death, Atherosclerosis

Diagnóstico de muerte súbita en el Hospital Dr. Agostinho Neto de Guantánamo, Cuba

RESUMEN

Introducción: El diagnóstico de muerte súbita representa un desafío para los sistemas sanitarios a nivel mundial.
Objetivo: Valorar las tendencias en el diagnóstico de muerte súbita.
Método: Estudio transversal, retrospectivo y correlacional en 58 casos con diagnóstico de muerte súbita a los que se les realizó necropsia en el Hospital Agostinho Neto de Guantánamo, Cuba, en el año 2015.
Resultados: Predominaron los pacientes fallecidos, con el mencionado diagnóstico, del sexo masculino (56,9%), en el medio extrahospitalario (55,2%) y debido a

Lecture presented to the II National Symposium on Sudden Cardiac Death and I Ibero-American Convention on Sudden Cardiac Death (December 6-9, 2016. Havana, Cuba).

causas no isquémicas (58,6%). En el 51,6% no se emitió el diagnóstico como se consigna en la nomenclatura internacional. El 90% de las muertes súbitas cardíacas isquémicas se produjeron por infarto agudo de miocardio y en el 88,2% de las no isquémicas se observó cardiomegalia global con hipertrofia o dilatación, o ambas, de las cavidades cardíacas. Se encontró correlación entre las causas directa y corregida de la muerte, y entre las intermedias y las básicas.

Conclusiones: Prevaleció la muerte súbita extrahospitalaria, de causa no isquémica. No se demostró correlación entre el lugar de fallecimiento, los grupos etarios y el sexo con las causas básicas y directas de muerte, y sí entre la causa directa de muerte original y la corregida, lo que denota que no se emitió el diagnóstico de muerte súbita como se consigna en la nomenclatura internacional.

Palabras clave: Muerte súbita, Muerte súbita cardíaca, Causas de muerte, Aterosclerosis

INTRODUCTION

The sudden death (SD), according to the World Health Organization, is the natural death that occurs within six hours of the onset of symptoms in an apparently healthy or sick person who is not expected to die in this time lapse, and it is classified into two types: sudden cardiac death (SCD), coronary or ischemic, and non-cardiac SD.

Other authors define it as a natural and unexpected death that takes place within the first hour of the onset of symptoms. The one which occurs from cardiac causes is due to alterations of the heart function, which produces the sudden loss of the brain's blood flow[2].

The frequency of SD reaches its maximum values in the first six months of life and between 45 and 75 years of age. Many are the causes that produce it, among which are found in the adult[2]: abnormalities of the coronary arteries, ventricular hypertrophy, myocardial disorders and heart failure; inflammatory, infiltrative, neoplastic and degenerative disorders; valvulopathies, congenital heart disease, electrophysiological abnormalities, electrical instability by neurohormonal influences and of the central nervous system, and other causes (SD during excessive physical activity, at the cafeteria, during acute alcoholism, acute asthma attack, acute embolism or of amniotic liquid).

In Cuba are developed different research projects in municipalities and health institutions focused on the study of different aspects of this subject, which have contributed to the characterization of the problem, in order to deploy actions to control it[3,4]; however, in Guantánamo, and specifically at the *Hospital Dr. Agostinho Neto*, there are no previous studies that allow an approach to the main causes of SD, or the related factors, thus, it is the purpose of this research to assess the behavior or trend of the SD diagnosis at this hospital and, more specifically, to determine if there is a correlation between:

a) The place of death, the age groups and sex of deceased patients with this diagnosis, with the basic and direct causes of death.
b) The direct cause of death, the original and the corrected, and the intermediate and contributory causes with the anatomopathological findings.
c) The atherosclerotic disease, and basic, direct and contributory causes of death.

METHOD

Type of study

A transversal retrospective and correlational study was conducted with the 58 cases diagnosed with SD and they were performed an autopsy at the *Hospital Dr. Agostinho Neto* in the province of Guantanamo, Cuba, in 2015.

Variables

Place of death: Nominal qualitative variable that was classified according to the place where the patient died, as stated in the documents evaluated. Some categories were assigned: out-of-hospital setting, at the Emergency Department, at the Emergency Intensive Care Unit (EICU) and at the hospitalization room.

Age groups: Ordinal qualitative variable depending on the age. They were grouped into several strata.

Sex: Nominal qualitative variable, depending on sex: female and male.

Table 1. Place of death according to direct cause of death. *Hospital General Docente Dr. Agostinho Neto*, 2015.

Place of death	Direct cause of death						Total	
	Ischemic SCD		Non-ischemic SCD		Non-cardiac SD			
	Nº	%	Nº	%	Nº	%	Nº	%
Out-of-hospital setting	10	45,4	21	61,7	1	50	32	55,2
Emergency	9	40,9	10	29,4	1	50	20	34,5
EICU	2	9,1	3	8,8	0	0,0	5	8,6
Hospitalization room	1	4,5	0	0,0	0	0,0	1	1,7
Total	22	37,9	34	58,6	2	3,4	58	100

EICU, Emergency Intensive Care Unit; SCD, sudden cardiac death; SD, sudden death
χ=0.149; p=0.263

Causes of death: Nominal qualitative variable depending on the basic, intermediate, contributory and direct causes of death, that appear in the autopsy protocol. Here are also included the direct causes of the original and corrected death, this latter, classified according to the normative documents, after analysis of medical records, records of the deceased and autopsy protocol.

Anatomopathological findings: Qualitative nominal variable, denominated according to the findings reflected in the autopsy.

Atherosclerotic disease: Qualitative nominal variable which is defined according to the existence of aortic, cerebral and coronary atherosclerosis, reflected in the autopsy protocol.

Collection and processing of information

The authors of this work were in charge of collecting the primary data, from the review of several documents. For the descriptive analysis, the frequency distribution and percentage were utilized, and for identifying the relationship among the nominal variables, the contingency coefficient was used. Furthermore, the statistical association related to the statistician p was calculated, where p≥0.05 is not significant and it is only below that value.

The results are presented in tables.

RESULTS

In **table 1** is exposed that in the studied population, the deceased patients diagnosed with SD at the out-of-hospital setting (55.2%) predominated, without any statistical correlation between both variables (value 0.149; p=0.263). It is worth noticing that only 8.6% of patients were provided care at the EICU, although the staff of this unit participates in the process of emergency care, where 34.5% of them died. Only 1 patient (1.7%) passed away in a hospitalization room, feasible data for further evaluation due to the sub record of this diagnosis in everyday practice.

Table 2. Causa directa de muerte según sexo.

Direct cause of death	Sex				Total	
	Female		Male			
	Nº	%	Nº	%	Nº	%
Ischemic SCD	10	17,2	12	20,7	22	37,9
Non-ischemic SCD	14	24,1	20	34,5	34	58,6
Non-cardiac SD	1	1,7	1	1,7	2	3,4
Total	25	43,1	33	56,9	58	100

SCD, sudden cardiac death; SD, sudden death

In the SCD, ischemic or not, deaths at the out-of-hospital setting predominated (45.4% and 61.7%, respectively), as well as 50% of the non-cardiac SD. Non-ischemic SCD (58.6%) predominated, followed by the ischemic (37.9%), and only 3.4% of patients died due to a non-cardiac SD.

No statistical correlation between the sex and the direct cause of death (**Table 2**) was found, but generally, males predominated (56.9%), diagnosed with non-ischemic (34.5% vs. 24.1%) or ischemic SCD (20.7% vs. 17.2%), and the non-cardiac SD was distributed equally in both sexes.

There was not demonstrated statistical correla-

Table 3. Direct cause of death according to the sex.

Basic cause of death	Sex				Total	
	Female		Male			
	Nº	%	Nº	%	Nº	%
Severe coronary-cardiosclerosis	22	88,0	25	75,7	47	81,0
Severe cerebral atherosclerosis	1	4,0	0	0,0	1	1,7
Mitral stenosis	0	0,0	1	3,03	1	1,7
Type II diabetes mellitus	0	0,0	1	3,03	1	1,7
Severe coronary sclerosis	1	4,0	4	12,1	5	8,6
Dilated cardiomyopathy	0	0,0	2	6,06	2	3,4
Squamous cell carcinoma of the cervix	1	4,0	0	0,0	1	1,7
Total	25	43,1	33	56,9	58	100

Contingency coefficient 0.329; p=0.319

Table 4. Direct cause of death according to age groups.

Age groups (years)	Direct cause of death						Total	
	Ischemic SCD		Non-ischemic SCD		Non-cardiac SD			
	Nº	%	Nº	%	Nº	%	Nº	%
19 – 30	0	0,0	0	0,0	0	0,0	0	0,0
31 – 40	1	4,7	1	3,03	0	0,0	2	3,5
41 – 50	1	4,7	3	9,1	0	0,0	4	7,1
51 – 60	4	19,04	11	33,3	0	0,0	15	26,7
61 – 70	8	38,1	5	15,2	1	50	14	25
71 – 80	3	14,3	6	18,2	1	50	10	17,8
81 – 90	4	19,0	7	21,1	0	0,0	11	19,6
Total	21	37,5	33	58,9	2	3,5	56	100

N=56; contingency coefficient 0.337; p=0.710
SCD, sudden cardiac death; SD, sudden death

tion between the sex and the basic cause of death (**Table 3**). In both sexes was present the prevalence of severe coronary-cardiosclerosis, confirming the relationship between the vascular atherosclerotic risk with the SCD. The 88% of women and 75.7% of men presented this diagnosis as basic cause of death.

Only in 56 cases it was possible to assess the age of the deceased, because in two of them, the data was missing and they did not have a hospital medical history to corroborate it, nor this information existed in the death certificate. When analyzing the distribution of the age groups, in relation to the direct cause of death (**Table 4**), a predominance of the group of 51-60 years (26.7%) was found, followed by 61-70 (25%) and, finally, 81-90 years old (19.6%). Six deaths (10.6%) occurred until the age of 50, and 3.5% to 40. In all age groups, except the one of 51-60, the non-ischemic cardiac deaths predominated. There was no statistical correlation between the studied variables.

In **table 5** is shown that in 30 patients (51.6%), the diagnosis of sudden death is not stated (the last four of the table) as established in the international nomenclature. There was a predominance of the diagnosis of malignant arrhythmia (44.8%), of which

Table 5. Correlation between the original and corrected direct cause of death.

Original direct cause of death	Corrected direct cause of death						Total	
	Ischemic SCD		Non-ischemic SCD		Non-cardiac SD			
	Nº	%	Nº	%	Nº	%	Nº	%
Ischemic SCD	7	12,1	2	3,4	0	0,0	9	15,5
Non-ischemic SCD	0	0,0	17	29,3	1	1,7	18	31,0
Non-cardiac SD	0	0,0	0	0,0	1	1,7	1	1,7
Malignant arrhythmia	12	20,7	14	24,1	0	0,0	26	44,8
Sudden death	1	1,7	0	0,0	0	0,0	1	1,7
Transmural AMI	1	1,7	0	0,0	0	0,0	1	1,7
SCD	1	1,7	1	1,7	0	0,0	2	3,4
Total	22	37,9	34	58,6	2	3,4	58	100

AMI, acute myocardial infarction; SCD, sudden cardiac death, SD, sudden death
p<0.001

Table 6. Correlation between intermediate and direct causes of death.

Intermediate cause of death	Direct cause of death						Total	
	Ischemic SCD		Non-ischemic SCD		Non-cardiac SD			
	Nº	%	Nº	%	Nº	%	Nº	%
Acute myocardial infarction	20	90,9	0	0,0	0	0,0	20	34,4
Global cardiomegaly by BVH	0	0,0	3	8,8	0	0,0	3	5,1
Global cardiomegaly by BVH and right dilatation	0	0,0	3	8,8	0	0,0	3	5,1
Global cardiomegaly by BVH and left dilatation	0	0,0	3	8,8	0	0,0	3	5,1
Global cardiomegaly by hypertrophy and biventricular dilatation	1	4,5	16	47,1	0	0,0	17	29,3
Cardiomegaly by concentric hypertrophy and biventricular dilatation	0	0,0	1	2,9	0	0,0	1	1,7
Global cardiomegaly by concentric hypertrophy of the LV	0	0,0	2	5,8	0	0,0	2	3,4
Cardiomyopathy	0	0,0	1	2,9	0	0,0	1	1,7
Pericarditis	0	0,0	1	2,9	0	0,0	1	1,7
Cardiomegaly by concentric hypertrophy of the LV and right dilatation	0	0,0	1	2,9	0	0,0	1	1,7
Liquefiable cerebral infarction	0	0,0	0	0,0	1	50	1	1,7
LV failure	1	4,5	0	0,0	0	0,0	1	1,7
Chronic renal failure	0	0,0	0	0,0	1	50	1	1,7
Not in record	0	0,0	3	8,8	0	0,0	3	5,1
Total	22	37,9	34	58,6	2	3,4	58	100

BVH, biventricular hypertrophy; SCD, sudden cardiac death; LV, left ventricle; SD, sudden death.
p<0.001

12 (20.7%) should have been recorded as ischemic and 14 (24.1%) as non-ischemic SCD. On the other hand, unclassified SD diagnoses were stated, acute transmural infarction and SCD, in 1 patient (1.7%) by category, which suffered ischemic SCD. In all cases, there were clinical and anatomopathological elements for this. The highest correlation existed in the diagnosis of non-ischemic SCD patients, where 17 of 18 (94.4%) had diagnostic correspondence. The ischemic SCD coincided in 77.7% (7 of 9 deceased). There was correlation between the analyzed variables (0.68) with statistically significant results (p<0.001).

Table 7. Direct cause of death according to the existence of atherosclerotic disease.

Direct cause of death	Atherosclerotic disease				Total	
	Yes		No			
	Nº	%	Nº	%	Nº	%
Ischemic SCD	18	40,9	4	28,5	22	37,9
Non-ischemic SCD	26	59,1	8	57,1	34	58,6
Non-cardiac SD	0	0,0	2	14,3	2	3,4
Total	44	75,8	14	24,1	58	100

SCD, sudden cardiac death; SD, sudden death

The 90.9% of deaths from ischemic SCD (20 cases) had the acute myocardial infarction as intermediate cause (**Tabla 6**), and 30/34 (88.2%) with corrected diagnosis of non-ischemic SCD presented some global cardiomegaly with hypertrophy, dilated right cavities, left or both, with the predominance of hypertrophy and biventricular dilation in 47.1%.

There was a high correlation between the analyzed variables (0.8) with statistically significant results (p<0.001).

In **table 7** is exposed the prevalence of the atherosclerotic disease for the SCD, whether or not ischemic. In 75.8% of the deceased patients was found aortic, coronary and cerebral atherosclerosis; of them, 40.9% in the ischemic and 59.1 % in the non-ischemic SCD. There was no correlation between the variables.

The 91.4% (53) of the deceased patients had atherosclerosis of the aorta and its branches (**Tabla 8**). Next, in order of decreasing frequency, the cerebral atherosclerosis (75.6%) and benign bilateral nephroangiosclerosis (63.8%). This behavior was the same for the SCD, ischemic or not. The two deceased by non-cardiac SD presented cardiomegaly by hypertrophy, dilation, or both, and pulmonary vascular sclerosis. There was no correlation between the variables in any of the findings.

Just in 26 patients (44.8% of total) were registered contributory diseases with death (non-tabulated data). The most frequent was high blood pressure 22/26 (84.6%), followed by its coexistence with diabetes mellitus (11.5%). The high blood pressure also prevailed in the two types of SCD, without demon-

Table 8. Anatomopathological findings according to the basic cause of death (n=58).

Anatomopathological findings	Basic cause of death						Total	
	Ischemic SCD		Non-ischemic SCD		Non-cardiac SD			
	Nº	%	Nº	%	Nº	%	Nº	%
Atherosclerosis of the aorta and its branches	19	32,8	33	56,9	1	1,7	53	91,4
Cerebral atherosclerosis	18	31,0	26	44,8	0	0	44	75,9
Benign bilateral nephroangiosclerosis	14	24,1	22	37,9	1	1,7	37	63,8
Global cardiomegaly due to hypertrophy and dilatation	11	19,0	3	5,2	2	3,4	16	27,6
Acute myocardial infarction	3	5,2	4	6,9	0	0,0	7	12,1
Pulmonary vascular sclerosis	0	0,0	3	5,2	2	3,4	4	6,9
PTE of fine branches	3	5,2	0	0,0	0	0,0	3	5,2
Liquefiable cerebral infarction	3	5,2	2	3,4	0	0,0	5	8,6

SCD, sudden cardiac death; SD, sudden death; PTE, pulmonary thromboembolism

strating the correlation among the variables under study.

DISCUSSION

The place of death is crucial for the recovery of patients suffering from medical emergencies. It is known that the survival rate of people suffering cardiac arrest by acute myocardial infarction, assisted in the out-of-hospital setting, is still low (less than 20%) and only a small percentage manages to recover without sequelae and fully reincorporation into society[5].

According to Spirgi[6], there is a loss between 15 and 20% of human lives every day for the lack of sufficient suitably prepared staff in the basic principles of first aid and resuscitation, being the general population, who, in most cases, faces such situations.

The results regarding the place of death, age groups, the high prevalence of atherosclerotic disease and contributory causes with death, coincide with other research dealing with similar themes[7-9].

The greater mortality is reached in men, with age over 60 years, and prehospital occurrence of the event. The high blood pressure and left ventricular hypertrophy were conditions that prevailed in the deceased patients, and acute myocardial infarction and cardiac arrhythmias, the main causes. In most of the patients were identified atherosclerotic lesions, as the cardiosclerosis, coronary-cardiosclerosis, cerebral atherosclerosis and in other locations, which coincides with Cuban studies[10].

These results reaffirm the need to act in the prevention and control of risk factors for these deaths and training the highest possible percentage of the population in the practice of first aid, to provide appropriate and correct care to the victims and, with it, to diminish potentially avoidable deaths.

It is very important also to implement validated strategies to control this health problem and to systematize actions for allowing to achieve uniformity in the way of establishing this diagnosis, in order to avoid records that do not correspond to the existent reality.

CONCLUSIONS

No statistical correlation was found between the place of death, age groups and sex, with the basic and direct causes of death. In over half of the cases there was no diagnosis of SD as stated in the international nomenclature; however, significant correlation between the original and corrected direct cause of death was found, which was greater for non-ischemic SCD. There was also a high correlation between intermediate and basic causes of death, for the ischemic SCD with acute myocardial infarction and non-ischemic with the global cardiomegaly by hypertrophy and biventricular dilation. In addition, the frequency of SCD in patients with atherosclerotic disease was high, and there prevailed the severe coronary-cardiosclerosis as the basic cause, high blood pressure as contributory, and atherosclerosis of the aorta among the anatomopathological findings.

REFERENCES

1. Hurtado de Mendoza Amat J. Autopsia. Garantía de calidad en la medicina [Internet]. La Habana: Ciencias Médicas; 2009 [citado 22 Ago 2016]. Disponible en: http://www.sld.cu/galerias/pdf/sitios/scap/libroc ompleto.pdf
2. Desmond GJ. Muerte cardíaca súbita. En: Bennet JC, Plum F, editores. Cecil Tratado de Medicina Interna. 10ma ed. México: McGraw-Hill Interamericana; 1983. p.152-8.
3. Ochoa Montes LA, Tamayo Vicente ND, González Lugo M, Vilches Izquierdo E, Quispe Santos JF, Pernas Sánchez Y, *et al*. Resultados del Grupo de Investigación en Muerte Súbita, 20 años después de su creación. Rev Cubana Salud Pública [Internet]. 2015 [citado 01 Sep 2016];41:298-323. Disponible en: http://scielo.sld.cu/pdf/rcsp/v41n2/spu10215.pdf
4. Pérez de Corcho Rodríguez MA, Pérez Assef JJ, Sevilla Pérez B, Mayola Alberto CC, Díaz Mizos FA. Estrategia con enfoque comunitario para prevenir los factores de riesgo de muerte súbita. Mediciego [Internet]. 2011 [citado 01 Sep 2016];17: [aprox. 8 p.]. Disponible en: http://bvs.sld.cu/revistas/mciego/Vol17_01_%202 011/pdf/T18.pdf
5. Neira JA, Bosque L, Gelpi F, Neira P. Manual de socorrismo básico para escuelas. Ministerio de Cultura y Educación de la Nación. Buenos Aires: Sociedad Argentina de Terapia Intensiva; 1999.
6. Spirgi R. Manual de atención médica de emergencia en situaciones de desastres naturales o producidas por el hombre. España: Ministerio de

Sanidad y Consumo; 1989. p. 55.
7. Ochoa Montes LA, González Lugo M, Vilches Izquierdo E, Fernández-Britto Rodríguez JE, Araujo González RE. Muerte súbita cardiovascular en poblaciones de riesgo. CorSalud [Internet]. 2014 [citado 04 Ago 2016];6(Supl. 1):71-8. Disponible en: http://www.corsalud.sld.cu/suplementos/2014/v6s1a14/pob-riesgo.html
8. Muratore C, Belziti C, Di Toro D, Gant López J, Mulassi A, Barrios A, *et al*. Precisión del certificado de defunción comparado con la autopsia verbal. Estudio PRISMA. Rev Argent Cardiol. 2006;74:211-6.
9. Carter-Monroe N, Virmani R. Tendencias actuales en la clasificación de la muerte súbita cardiaca según los datos de autopsias: una revisión de los estudios sobre la etiología de la muerte súbita cardiaca. Rev Esp Cardiol. 2011;64:10-2.
10. Ochoa Montes LA, Miguélez Nodarse R, Vilches Izquierdo E, Pernas Sánchez Y. El desafío mundial de la muerte súbita cardíaca en el nuevo milenio. Resumen de un estudio cubano. CorSalud [Internet]. 2012 [citado 04 Ago 2016];4:278-86. Disponible en: http://www.corsalud.sld.cu/sumario/2012/v4n4a12/ms.html