

# Research Group on Sudden Death (GIMUS) of Cuba Sudden Cardiovascular Death: A Global Challenge

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## Abstract

Introduction: Sudden cardiovascular death (SCD) constitutes the main challenge for Cardiology in this century. One out of every two cardiovascular deaths is due to this universal health problem. Objective: To present scientific evidence that justifies this global challenge, and to mention the research results of the Research Group on Sudden Death (GIMUS) of Cuba. Material and method: Research results of the SUCADES study carried out in Cuba (1995-2020) are presented, applying the research protocol contained in the Cuban Guide for SCD research works. Results: The GIMUS has developed in a period of 25 years? scientific research with the application of a diagnostic algorithm and the use of a Primary Data Collection Model to 33 718 natural deaths, documenting 2 252 sudden deaths, representing 6.6

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**Index terms**— sudden cardiovascular death, incidence, challenge, research, Cuba.

Summary-Introduction: Sudden cardiovascular death (SCD) constitutes the main challenge for Cardiology in this century. One out of every two cardiovascular deaths is due to this universal health problem.

## 1 Introduction

Cardiovascular diseases are currently the most common cause of premature death and disability in the world. Of an estimated 56.4 million deaths that occurred in 2016, according to a report published by the World Health Organization (WHO), 31.3% (17.9 million) corresponded to deaths from diseases of the heart and blood vessels. In the region of the Americas, 6.8 million deceased; 1.5 million corresponded to this group of diseases. Future projections indicate that this disease will continue to be the leading cause of death in industrialized countries and will become the third in those that are currently developing. (1) One in two of these deaths is due to one of manifestations of greatest impact and significance within ischemic heart disease: sudden cardiovascular death (SCD). (2) Some authors, among whom we include ourselves, consider this health problem as one of the main challenges for the Cardiology in the present century. (2)(3)(4) SCD is defined as a natural death due to cardiac causes, announced by sudden loss of consciousness, which occurs within one hour, after the onset of acute symptoms, in an individual with a preexisting heart disease, known or not by the patient, but the time and manner of death are unexpected.

In the case of not being witnessed (occurs in two thirds of the cases) it is considered sudden if the victim was seen alive 24 hours prior to the event and in cases in which life is maintained thanks to the use of mechanical devices, it is considered the time of death as the time to put the patient under these artificial supports. (3) II.

## 2 World Epidemiology

Based on an epidemiological analysis of sudden cardiovascular mortality carried out in the United States (5) and based on current data on the world population, we estimate a worldwide sudden mortality from cardiac causes of 4.4 to 5.6 million annually of deaths, which represents 15,342 deaths per day and 10 per minute.

Between 400-500,000 SCDs occur annually in the United States. (6) A study carried out between the years 2005 to 2015 in that country; showed an incidence of 110.8 per 100,000 (7) , data much higher than that reported by Chugh SS and collaborators in a prospective investigation during the years 2002-2003 in population groups in Oregon, where the incidence was 53 per 100,000 inhabitants. (8) Incidence reports in Australia and New Zealand

## 8 OFFICIAL RECORDS OF SUDDEN CARDIAC DEATH IN THE COUNTRIES

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are 99.4 per 100,000 inhabitants. (9) An SCD study in 27 European countries reported rates of 84 per 100,000 population. (10) Other nations such as South Korea (11) and Japan (12) show a low incidence range with records of 20.1 per 100,000 inhabitants and 14.9 per 100,000 inhabitants respectively. III.

### 3 Epidemiology in Cuba

In 2019, 25,864 deaths from cardiovascular diseases were registered in Cuba, for a rate of 228.2 per 100,000 inhabitants, of which ischemic heart diseases (IHD) represent 62.9%, with a mortality rate of 144.5 per 100,000 inhabitants. Within this group, IHD is the most prevalent, and responsible for one of every four deaths that take place; representing approximately 80% of the total number of deaths from heart disease in both sexes. Based on the research work carried out in the last 25 years by the Sudden Death Research Group (GIMUS) of Cuba (Figure 1) and the information published by the statistical yearbook of the Ministry of Public Health (MINSAP), we estimate for the In 2019, the occurrence of 8,021 sudden events, meaning 22 daily deaths and 1 episode every 65 min, with an incidence of 71.6 x 100,000 inhabitants, representing 7.8% of the natural deaths that occurred in that year. (13) Source: Archives -GIMUS The research diagnostic algorithm was applied and based on the diagnostic criteria for SCD (3) Major criterion -Unexpected nature of death: It can affect individuals with known or unknown pre-existing heart disease, but it occurs abruptly, unexpectedly.

Minor criteria -Natural death: biological death, except for violent or traumatic causes. -Fast: it occurs in a short period of time instantly or in a short period of time (minutes, hours). This is the most controversial pillar when trying to define the phenomenon.

2 528 deaths were included as "probable" SCD, which underwent a clinical or legal autopsy and an interview with family members and treating physicians in order to obtain data for the investigation.

With the results of this new stage in the case study, 276 cases were excluded for different reasons (no cardiovascular etiology, no time criteria for SCD, incomplete data in the medical and family records, and unreachable healthcare personnel).

At the conclusion of the research protocol applied according to the Cuban Guide for SCD research work, (14) 2 252 deaths were "confirmed" under this condition, representing 6.7% of the natural deaths studied. IV. Sudden Cardiovascular Death: A Global Challenge SCD in the opinion of many researchers, (2)(3)(4)(5) constitutes the main challenge for Cardiology in this century, and an important challenge for health systems worldwide, as well as a pending issue for physicians who participate in the care for patients with cardiac arrest and cardiovascular diseases.

The above statement is justified by its high incidence, its impact on the economical and social systems of the countries, as it constitutes the third cause of years of life potentially lost, only surpassed by non-sudden cardiovascular deaths and cancer, causing serious losses in the family, economic and social sphere, in the face of the unexpected death of an "apparently healthy" individual, on many occasions prematurely, at young ages, which gives the episode a dramatic character. (2) Particular aspects of this entity, and others related to the health systems of the countries, make this entity an universal challenge and explain the variations in the reports on its incidence in the different nations.

Among these aspects, and in the opinion of the authors of this article, are:

### 4 Records of the Incidence of Coronary Disease in the Nations

The reports on the incidence and prevalence of coronary artery disease in the countries show different values. Coronary disease constitutes up to 80% of the etiology of SCD. (2,3,5)

### 5 Operational Definition used in Individual Studies

There is no universally accepted operational definition among the disciplines that study the phenomenon for use in individual studies, which makes it difficult to compare the findings. (2,15,16)

### 6 Conditions of Occurrence

Given its unexpected and sudden nature, the episode occurs more frequently in the place where the victim lives and develops their activities, for which the rhythm when the episode occurs is unknown in more than 50% of cases, with a short period of time (instants, minutes) between the onset of symptoms and diagnosis. (2,3,15)

### 7 Presential Witnesses at the Event

In a third of sudden events, there are no eyewitnesses to provide information about the circumstances in which the episode occurs. The short duration of the premonitory symptoms, generally expressed by sudden loss of consciousness, together with the absence of witnesses, makes diagnosis difficult. (2,3,5)

### 8 Official Records of Sudden Cardiac Death in the Countries

Despite being included in the International Statistical Classification of Diseases and Health-related Problems, (17) under the codes (I.46.1), R (95), R 96 (RR 96.0, 96.1), in not all countries there are official records for the

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SCD, which means that the studies are carried out taking as a reference the casuistry of the emergency services, rejecting the cases of SCD not witnessed. (15,18,19)

## 9 Data Records in SCD Epidemiological Studies

The plausibility in the registration of information in epidemiological studies on this problem is questionable, considering, as a source of obtaining the information, the medical death certificate.

Much of the current data on the incidence of SCD continues to come from retrospective studies consisting of reviews of medical records and medical death certificates, (16) which are inaccurate in defining the cause of death (50% accuracy) (20) and considerably overestimate the incidence of SD (200-300%). (16,18) A very limited number of studies use autopsy data to catalog the cause of SCD. (16,19)

## 10 Scientific Performance and Medical Competence

The knowledge of this health problem "Sudden death" and the correct interpretation of the use of this term are decisive to know its magnitude. Despite being included in the International Classification of Diseases (ICD-10 edition) (17) , not all doctors who face this problem on a daily basis correctly assume its mention as a cause of death in the medical death certificate, which encourages underreporting statistics in different countries and regions of the world.

## 11 Economic-Social Development of the Populations Analyzed

Both the behavior of the phenomenon and the quality in the collection of information on the event are related to the economic and social level of the geographical areas and nations where the studies are carried out. (21)

## 12 Interdisciplinarity in your Study

The approach to this important health problem worldwide, given its complexity and the diversity of population groups in which it occurs, goes beyond the field of study of any particular discipline, so joint efforts are needed, which from an integrative perspective, ensure better conditions to deal with this scourge. It is necessary to abandon erroneous positions that seek to frame the study of SCD in a particular discipline or specialty. Any effort in its study must take into account the multifactorial and multicausal nature of this phenomenon. That is why a consensus is required by the multiple biomedical specialties, among which are: Cardiology, Internal Medicine, Pathology, Legal Medicine, Neurology, Pulmonology, Pediatrics, Sports Medicine, Intensive Care and Emergencies, Medical Genetics, Toxicology, Public Health, Nursing, Health Statistics, as well as other non-medical disciplines such as: Psychology, Demography, Sociology, among others. (22) V.

## 13 Conclusions

The global challenge that the SCD represents is justified by its high incidence, its impact on the economic, health and social systems of the countries and the drama in its presentation. It is necessary to achieve a comprehensive vision in the confrontation with this universal health problem, assuming the main actions from interdisciplinarity to achieve results that allow its reduction. <sup>1 2</sup>

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Figure 1: Figure 1 :

## .1 Conflict of interests

The authors declare not to have any interest conflicts.

## .2 Authors' contribution

- [Ochoa-Montes et al.] , L Ochoa-Montes , R Araujo-González , D Ferrer-Marrero . La muerte súbita cardiovascular en su devenir entre interdisciplinariedad e intersectorialidad. Medisur (revista en Internet)
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## 13 CONCLUSIONS

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