



**Universidade de São Paulo**

**Biblioteca Digital da Produção Intelectual - BDPI**

---

Outros departamentos - FM/Outros

Artigos e Materiais de Revistas Científicas - FM/Outros

---

2012

# Sudden Cardiac Death in Brazil: Study Based on Physicians' Perceptions of the Public Health Care System

---

PACE-PACING AND CLINICAL ELECTROPHYSIOLOGY, HOBOKEN, v. 35, n. 11, pp. 1326-1331, NOV, 2012

<http://www.producao.usp.br/handle/BDPI/42722>

*Downloaded from: Biblioteca Digital da Produção Intelectual - BDPI, Universidade de São Paulo*

# Sudden Cardiac Death in Brazil: Study Based on Physicians' Perceptions of the Public Health Care System

MARTINO MARTINELLI, M.D., PH.D.,\* SÉRGIO F. DE SIQUEIRA, ENG., M.Sc.,\*

LEANDRO I. ZIMERMAN, M.D., PH.D.,† VICENTE Á. NETO, M.D., PH.D.,‡

ANTÔNIO V. MORAES JR., M.D., PH.D.,§ and GUILHERME FENELON, M.D., PH.D.¶

From the \*Heart Institute (InCor) do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil; †Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil; ‡Hospital São Joaquim da Benemérita Associação Portuguesa de Beneficência de São Paulo, São Paulo, Brazil; §Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto, Ribeirão Preto, Brazil; and ¶Escola Paulista de Medicina, Universidade Federal de São Paulo, São Paulo, Brazil

**Background:** There are no available statistical data about sudden cardiac death in Brazil. Therefore, this study has been conducted to evaluate the incidence of sudden cardiac death in our population and its implications.

**Methods:** The research methodology was based on Thurstone's Law of Comparative Judgment, whose premise is that the more an A stimulus differs from a B stimulus, the greater will be the number of people who will perceive this difference. This technique allows an estimation of actual occurrences from subjective perceptions, when compared to official statistics. Data were collected through telephone interviews conducted with Primary and Secondary Care physicians of the Public Health Service in the Metropolitan Area of São Paulo (MASP).

**Results:** In the period from October 19, 2009, to October 28, 2009, 196 interviews were conducted. The incidence of 21,270 cases of sudden cardiac death per year was estimated by linear regression analysis of the physicians' responses and data from the Mortality Information System of the Brazilian Ministry of Health, with the following correlation and determination coefficients:  $r = 0.98$  and  $r^2 = 0.95$  (95% confidence interval 0.8–1.0,  $P < 0.05$ ). The lack of waiting list for specialized care and socioadministrative problems were considered the main barriers to tertiary care access.

**Conclusions:** The incidence of sudden cardiac death in the MASP is high, and it was estimated as being higher than all other causes of deaths; the extrapolation technique based on the physicians' perceptions was validated; and the most important bureaucratic barriers to patient referral to tertiary care have been identified. (PACE 2012; 35:1326–1331)

## sudden cardiac death, cardiac arrhythmias, psychophysical evaluation, public health

### Introduction

Cardiac arrhythmias, specifically ventricular tachyarrhythmias, are the leading cause of sudden cardiac death (SCD). This is a serious public health problem worldwide, with an incidence that is rising annually, and it should be addressed vigorously. Particularly in Brazil, Chagas' heart disease certainly contributes significantly to the incidence of SCD, but this has not been estimated yet.<sup>1–4</sup>

For many years, the Brazilian medical community has been using American epidemiological data, which estimate the occurrence of

250,000–300,000 cases of SCD per year, in an attempt to establish prevention strategies in our country.<sup>5–7</sup> To this end, several entities, led by the Brazilian Society of Cardiology (SBC), are investing in the training of physicians, paramedics, and laypersons to assist SCD victims.

The Brazilian Society of Cardiac Arrhythmias (SOBRAC-SBC) annually promotes a National Campaign for Prevention of Cardiac Arrhythmias and Sudden Death, which is called "Coração na Batida Certa" (Heart on the Right Beat), a program to educate the general population on how cardiac arrhythmias may pose a threat to life.<sup>8</sup>

However, for this process to be well succeeded, much more investment is needed, and the essential strategy is mastering the regional epidemiological data, which may help raise awareness of public agencies on the need to adopt urgent measures in the primary and secondary prevention for individuals exposed to SCD risk.

Therefore, we decided to conduct a study to evaluate our reality, programmed to be implemented incrementally, by regions, due to the

---

Sponsors: Brazilian Society of Cardiac Arrhythmias (SOBRAC-SBC) and Department of Cardiac Pacing (DECA-SBCCV).

Address for reprints: Martino Martinelli Filho, M.D., Instituto do Coração (InCor) – Hospital das Clínicas da Universidade de São Paulo, Av. Enéas de Carvalho Aguiar, 44 – CEP 05403-000, São Paulo, SP, Brasil. Fax: 55-11-30817148; e-mail: martino@incor.usp.br

Received May 8, 2012; accepted July 21, 2012.

doi: 10.1111/j.1540-8159.2012.03501.x

large territory and the geopolitical diversity of our country.

A conventional field study method would be ideal, but this method is known to involve serious hindrances, especially as regards a theme that has multiple causal factors, which greatly reduces the chance that the problem will be noticed.<sup>9</sup>

Therefore, to make feasible a study to estimate the incidence of SCD in Brazil and outline the problems associated with the treatment of subjects exposed to SCD risk, we adopted an innovative technique based on the perception of the physician.

### Methods

The methodological basis of the research was Thurstone's Law of Comparative Judgement,<sup>10-12</sup> as systematized by Torgerson.<sup>13,14</sup> The premise of this concept is that the more an A stimulus differs from a B stimulus, the greater the number of people who will notice this difference.<sup>11,12</sup>

Thurstone's theorem allows to estimate an objective interval scale from a subjective perception. This interval scale is monotonic and the real absolute value is often not known. Therefore, using official figures as anchors, it is possible to deduce the equation that transforms Thurstone's subjective interval scale into absolute numbers of actual occurrences.

The research data were collected through telephone interviews conducted with primary and secondary care physicians of the public Health Care System, selected from a geographic registry of physicians (Geolistas; <http://www.geolistas.com.br>). The area covered was the Metropolitan Area of São Paulo (MASP), which includes the municipalities listed in Table I.

The interviews were arranged in a  $7 \times 3$  balanced incomplete block design,<sup>15</sup> which means asking questions matching two known causes with the unknown cause (triad). In this study, two known causes of death were compared to SCD (the unknown cause). The following questions were asked: Among these three causes of death, which is the most frequent? And which is the least frequent? We selected six main causes of death according to ICD-10 codes used by database of the Mortality Information Services of the Brazilian Ministry of Health (DATASUS/SIM), and added SCD, whose magnitude is unknown

Seven orthogonal blocks were created (one for each triad), and these were replicated in 28 interviews, amounting 196 interviews. Each pair of causes and each triad were evaluated 28 times, and each single cause 168 times by comparisons among them. Each block had 28 interviews that were evenly distributed among Basic Health

**Table I.**

Municipalities of the Metropolitan Area of São Paulo

| Code   | Municipality          | Code   | Municipality           |
|--------|-----------------------|--------|------------------------|
| 350390 | Arujá                 | 352850 | Mairiporã              |
| 350570 | Barueri               | 352940 | Mauá                   |
| 350660 | Biritiba-Mirim        | 353060 | Mogi das Cruzes        |
| 350900 | Caieiras              | 353440 | Osasco                 |
| 351060 | Carapicuíba           | 353910 | Pirapora do Bom Jesus  |
| 350920 | Cajamar               | 353980 | Poá                    |
| 351300 | Cotia                 | 354330 | Ribeirão Pires         |
| 351380 | Diadema               | 354410 | Rio Grande da Serra    |
| 351500 | Embu                  | 354500 | Salesópolis            |
| 351510 | Embu-Guaçu            | 354680 | Santa Isabel           |
| 351570 | Ferraz de Vasconcelos | 354730 | Santana de Parnaíba    |
| 351630 | Francisco Morato      | 354780 | Santo André            |
| 351640 | Franco da Rocha       | 354870 | São Bernardo do Campo  |
| 351830 | Guararema             | 354880 | São Caetano do Sul     |
| 351880 | Guarulhos             | 354995 | São Lourenço da Serra  |
| 352220 | Itapecerica da Serra  | 355030 | São Paulo              |
| 352250 | Itapevi               | 355250 | Suzano                 |
| 352310 | Itaquaquecetuba       | 355280 | Taboão da Serra        |
| 352500 | Jandira               | 355645 | Vargem Grande Paulista |
| 352620 | Juquitiba             |        |                        |

**Table II.**

Official Data on Causes of Deaths Published in 2007 by the Mortality Information Service (DATASUS/SIM) of the Ministry of the Health, and Thurstone Scale of Perception of Causes of Deaths

| Cause of Death                                 | Number of Deaths | Thurstone Scale of Perception (Standard Degrees) |
|--|------------------|--|
| Sudden cardiac death                           | TBD              | 0.86   |
| Infectious and parasitic diseases              | 4,517            | 0.06   |
| Cancer   | 20,703           | 0.66   |
| Endocrine, nutritional, and metabolic diseases | 4,897            | 0.03   |
| Diseases of the digestive system               | 6,823            | -0.65  |
| Diseases of the genitourinary system           | 2,168            | -1.06  |
| External causes                                | 11,285           | 0.11   |

Care Units (BHU), Health Care Facilities (HCF), Outpatient Clinics, and Hospitals.

The official numbers of deaths, according to causes, were obtained from the DATASUS/SIM,<sup>16</sup> stressing that the latest available statistics are from 2007 (Table II).

The research was commissioned to AnEx Futuros (Analytical Expertise & Scenarios; <http://anexfuturos.blogspot.com>) and LPM—Surveys and Research in Marketing (<http://www.lpm-research.com.br>); and financial support was provided by SOBRAC-SBC and the Department of Cardiac Pacing (DECA-SBCCV).

### Results

One hundred ninety-six telephone interviews were conducted in the period from October 19, 2009, to October 28, 2009.

The estimated incidence of SCD due to arrhythmias was 21,270 cases.

The comparison between data predicted by the physicians' perceptions achieved by Thurstone model and the official data from the Ministry, obtained by linear regression, demonstrated a correlation coefficient of 0.95 (Fig. 1).

Deaths caused by infectious and parasitic diseases and endocrine, nutritional, and metabolic diseases were recognized as confounding variables for physicians' perceptions. This situation derives

from an overlapping of SCD causes and its consequences are shown in Figure 2.

Regarding the mapping of problems associated with the treatment of the patients exposed to SCD risk, it was observed that there were no waiting lists, and the causes reported by physicians were: (1) mismanagement of the system, such as lack of funding and bureaucracy (43% of answers); (2) alienation, ignorance, and indifference of physician (37%); (3) work being performed satisfactorily (25%); (4) patient related issues of poverty and misinformation (5%) (Table III).

Regarding the difficulties in referring patients to tertiary care centers, the difficulties stated were (1) delay in scheduling appointments (41%); (2) lack of specialists (37%); (3) lack of beds in hospitals (22%); (4) bureaucracy of the Health Care System (17%); (5) unequipped hospitals (15%) (Table IV).

### Discussion

This study was the first to estimate the incidence of SCD in our country. Using an innovative application of methodology in the area, the study revealed an incidence of 21,270 cases of SCD per year, in a region of significant demographic density, the MASP.

The projection of these findings for the whole population would mean about 366,613 cases of SCD per year, an incidence similar to American estimates<sup>5</sup> which, unlike ours, do not contemplate the inclusion of Chagas' heart disease.

In this study, it is very important to emphasize that the viability of using techniques of extrapolation of epidemiological information through the physicians' perceptions seems to represent a finding as expressive as the numerical estimates obtained, because it opens up a path for a fast, objective, and systematic search of regional information. These regional data create a regional hierarchical scenario that allows a comparison between the extrapolation findings with local official data.<sup>16,17</sup>

Therefore, in our study it was possible to document that the incidence of SCD in São Paulo is superior to deaths from all types of cancer and nearly two times higher than deaths from external causes (accidents, poisoning, murder, suicide, etc.).

This regional epidemiological information is fundamental to the development of specific public health policy actions. It is also a prerequisite for stimulating further intervention studies that will become part of the arsenal of evidence-based medicine.

Although less striking, other findings of this study, such as the barriers in the management of waiting lists and the bureaucratic process, must

SUDDEN CARDIAC DEATH IN BRAZIL

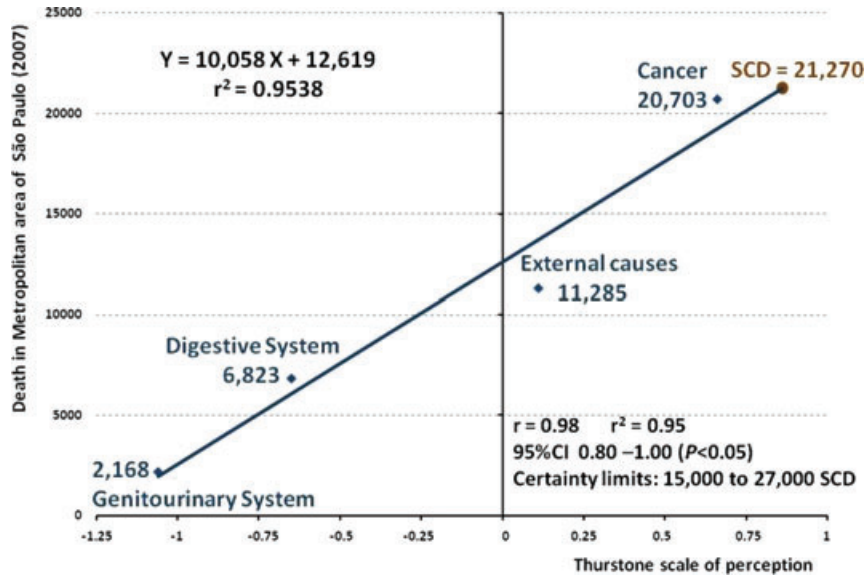


Figure 1. Estimated numbers of deaths from various causes with the extrapolation of values for sudden death.  $r$  = correlation coefficient;  $r^2$  = determination coefficient; CI = confidence interval.

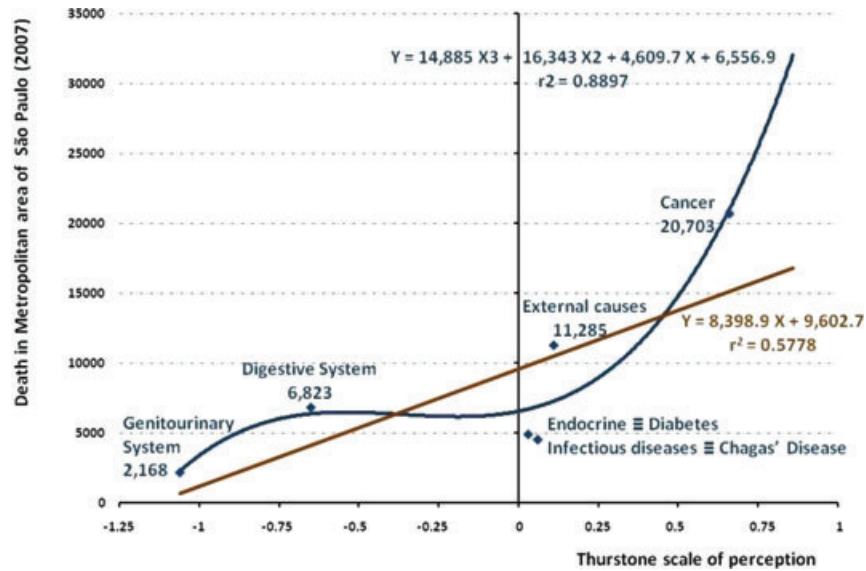


Figure 2. Simulation of linear and cubic regression in the presence of confounding factors to the physicians' perceptions: causes of death due to Chagas, disease and diabetes overlapping sudden cardiac death.  $r$  = correlation coefficient;  $r^2$  = determination coefficient; CI = confidence interval.

at least serve as an important record for other administrative actions.

Thus, in a practical exercise aiming at discussing public health policy actions specifically focused on prevention, based on the estimated incidence of about 21,000 SCD per year demonstrated in this study, it is possible to consider that a significant percentage of this population

would be protected by pharmacological and nonpharmacological approaches.

Specific programs for risk factor prevention like control of diabetes, dyslipidemia, hypertension, and others would have a considerable impact. Beyond this, actions which favor access to primary health care, ICD implantation, and prehospital care by the Mobile



**Table III.**

Problems Related to the Lack of Waiting Lists for Referring Patients with Cardiac Arrhythmias from Basic Units to Tertiary Care

| Type of Response                                   | Response Occurrence Rate (%) |
|--|------------------------------|
| System management: lack of funding and bureaucracy | 43                           |
| Alienation, ignorance, indifference of physician   | 37                           |
| The work is being performed satisfactorily         | 25                           |
| Patient-related issues: Poverty and Misinformation | 5                            |

Emergency Care (Serviço de Atendimento Móvel de Urgência—SAMU) are recognized as effective resolutions.<sup>18,19</sup>

Considering all these points, we could estimated that up to 60% of our population (about 12,600 cases) would be protected from fatal events.<sup>20–22</sup> The remaining cases (about 8,400 cases) would be candidates for defibrillator implantation.<sup>23–25</sup>

Despite these significant findings (2007), DATASUS records show that only 331 devices were implanted (25:1 ratio) in the MASP, during

**Table IV.**

Causes of Problems in Referring Patients with Cardiac Arrhythmias from Basic Units to Tertiary Care

| Type of Response                      | Response Occurrence Rate (%) |
|---------------------------------------|------------------------------|
| Delay in scheduling appointments      | 41                           |
| Lack of specialists                   | 37                           |
| Lack of beds in hospitals/ICU         | 22                           |
| Bureaucracy of the health care system | 17                           |
| Unequipped hospital                   | 15                           |

ICU = intensive care unit.

that same period, which represents a gross distortion and a true challenge for new actions in public health policy.

Therein, this study represents just another warning sign for the Brazilian Medical Society who suffer from missing significant scientific and social information.

In conclusion, the estimated incidence of SCD in this study was high: 21,270 cases per year in the MASP; the technique of extrapolation through physicians' perceptions is feasible; the major bureaucratic barriers related to management of correlative problems have been identified and the rate of ICD implantation for prevention is currently low.

## References

- Pratt CM, Greenway PS, Schoenfeld MH, Hibben ML, Reiffel JA. Exploration of the precision of classifying sudden cardiac death: Implications for the interpretation of clinical trials. *Circulation* 1996; 93:519–524.
- Goldberger JJ, Cain ME, Hohnloser SH, Kadish AH, Knight B, Lauer MS, Maron BJ, et al. American Heart Association/American College of Cardiology Foundation/Heart Rhythm Society Scientific Statement on Noninvasive Risk Stratification Techniques for Identifying Patients at Risk for Sudden Cardiac Death A Scientific Statement from the American Heart Association Council on Clinical Cardiology Committee on Electrocardiography and Arrhythmias and Council on Epidemiology and Prevention. *Circulation* 2008; 118:1497–1518.
- Bestetti R, Cardinali-Neto A. Sudden cardiac death in Chagas' heart disease in the contemporary era. *Int J Cardiol* 2008; 131:9–17.
- Rassi A Jr., Rassi SG, Rassi A. Sudden death in Chagas' disease. *Arq Bras Cardiol* 2001; 76:86–96.
- Chugh S, Reinier K, Teodorescu C, Evanado A, Kehr E, Al Samara M, Mariani R, et al. Epidemiology of sudden cardiac death: Clinical and research implications. *Prog Cardiovasc Dis* 2008; 51:213–228.
- Myerburg RJ. Scientific gaps in the prediction and prevention of sudden cardiac death. *J Cardiovasc Electrophysiol* 2002; 13:709–723.
- Myerburg RJ, Castellanos A. Cardiac arrest and sudden cardiac death. In: Zipes DP, Libby P, Bonow RO, Braunwald E (eds.): *Braunwald's Heart Disease. A Textbook of Cardiovascular Medicine*. Philadelphia, Elsevier Saunders, 2005, pp. 865–908.
- Sociedade Brasileira de Arritmias Cardíacas. Available at: <http://www.sobrac.org> (accessed October 25, 2011).
- Rouquayrol MZ, Almeida Filho N. *Epidemiologia & Saúde*. Rio de Janeiro RJ, MEDSI, 2003.
- Thurstone LL. A law of comparative judgment. *Psychol Rev* 1927; 34:273–286.
- Thurstone LL. *The Measurement of Values*. Chicago, The University of Chicago Press, 1959.
- Krabbe PFM. Thurstone Scaling as a measurement method to quantify subjective health outcomes. *Med Care* 2008; 46:357–365.
- Torgerson WS. Scaling and test theory. *Annu Rev Psychol* 1961; 12:51–70.
- Torgerson WS. *Theory and Methods of Scaling*. New York, Wiley International Edition, John Wiley & Sons Inc, 1958.
- Cochran WG, Cox GM. *Experimental Designs*. New York, Wiley International Edition, John Wiley & Sons Inc, 1957.
- Ministério da Saúde. Sistema de Informação de Mortalidade (SIM) Available at: <http://tabnet.datasus.gov.br/cgi/defecto.htm.exe?sim/cnv/obtbr.def> (accessed October 14, 2009).
- Maydeu-Olivares A, Böckenholt U. Modeling subjective health outcomes top 10 reasons to use Thurstone's method. *Med Care* 2008; 46:346–348.
- Sayre MR, Koster RW, Botha M, Cave DM, Cudnik MT, Handley AJ, Hatanaka T, et al. Adult basic life support: 2010 International Consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. *Circulation* 2010; 122:S298–S324.
- Semensato G, Zimmerman L, Rohde LE. Avaliação inicial do Serviço de Atendimento Móvel de Urgência na Cidade de Porto Alegre. *Arq Bras Cardiol* 2011; 96:196–204.
- MERIT-HF Study Group. Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomised Intervention Trial in Congestive Heart Failure (MERIT-HF). *Lancet* 1999; 353:2001–2007.

## SUDDEN CARDIAC DEATH IN BRAZIL

21. Julian DG, Camm AJ, Frangin G, Janse MJ, Munoz A, Schwartz PJ, Simon P. Randomised trial of effect of amiodarone on mortality in patients with left ventricular dysfunction after recent myocardial infarction: EMIAT. *Lancet* 1997; 349:667–674.
22. Cairns JA, Connolly SJ, Roberts R, Gent M. Randomised trial of outcome after myocardial infarction in patients with frequent or repetitive ventricular premature depolarisations: CAMIAT. *Lancet* 1997; 349:675–682.
23. The Antiarrhythmics versus Implantable Defibrillators (AVID) Investigators. A comparison of antiarrhythmic-drug therapy with implantable defibrillators in patients resuscitated from near-fatal ventricular arrhythmias. *N Engl J Med* 1997; 337:1576–1584.
24. Moss AJ, Zareba W, Hall WJ, Klein H, Wilber DJ, Cannom DS, Daubert JP, et al. Prophylactic implantation of a defibrillator in patients with myocardial infarction and reduced ejection fraction. *N Engl J Med* 2002; 346:877–883.
25. Bardy GH, Lee KL, Mark DB, Poole JE, Packer DL, Boineau R, Domanski M, et al. Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. *N Engl J Med* 2005; 352:225–237.