

## SPECIAL ARTICLE

# Status of Cardiovascular Disease in Puerto Rico

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**For the last 40 years diseases of the heart has ranked as the primary cause of death in Puerto Rico, being cancer the second. In the National Vital Statistics of the Department of Health of Puerto Rico for the year 2002, cancer is listed as the main cause of death and diseases of the heart ranks as the second most frequent. This unexpected change is mainly due a new classification by ICD-10, that now substitutes ICD-9, in association to a change introduced by using the 2000 population census rather than the 1990 census used until 1999. Additional relevant information concerning life**

**expectancy at birth, death by specific causes in the last 5 years and statistics about invasive surgical and medical services rendered to cardiovascular patients in the year 2003 are included. A summary of the situation concerning postgraduate training programs in Puerto Rico in different cardiovascular subspecialties is also included.**

*Key words: Life expectancy at birth, Death by specific causes, Invasive cardiology services, Cardiovascular Postgraduate Training.*

**F**or more than 25 years cardiovascular disease has been the commonest cause of death in most advanced countries of the world, including Puerto Rico. Cardiovascular disease is the leading cause of death around the world particularly in individuals 65 years of age and older (1). This has occurred in spite of the significant advances concerning early diagnosis, medical and surgical management, as well as the institution of primary and secondary prevention measures.

The prevalence and incidence of heart and vascular diseases including hypertension, cardiovascular and peripherovascular disease increases, particularly after 45 years of age. In the female, the development of menopause leads to an increase in cardiovascular diseases. Hypertension occurs in 50% of the population aged 60 years and 66.6% of those aged 70 years and older (2). According to the 2000 census, the population of Puerto Rico for the year 2001 was 3,839,810 with a larger segment in the female population (Table 1). As there are 759,660 inhabitants aged 40 and above, it is reasonable to expect a considerable number of persons with cardiovascular diseases. As the population reaching 65 year of age and older will increase considerably in the next 20 years in the U.S. and Puerto Rico, it is mandatory for the health

**Table 1.** Puerto Rico 2001, Population by Sex and Age Groups

| Age Interval | Males    | Females   | Both Sexes |
|--------------|----------|-----------|------------|
| 30-34        | 126,740  | 136,322   | 263,062    |
| 40-44        | 118,303  | 136,521   | 254,824    |
| 50-54        | 107,347  | 125,662   | 233,009    |
| 60-64        | 76,373   | 89,025    | 165,398    |
| 70-74        | 8,605    | 0,771     | 109,376    |
| 80-84        | 3,573    | 32,188    | 55,761     |
| All ages     | 1,847,59 | 1,992,251 | 3,839,810  |

More females since age interval 20-24 on.  
In earlier ages males predominate.

authorities to emphasize and provide increased attention to the cardiovascular health care of the elderly (3).

## Life Expectancy at Birth in Puerto Rico

In Puerto Rico there has been a consistent increase in the life expectancy at birth (4) as shown by Table 2. This dramatic increase of life expectancy through the years most likely is a reflection of the important economic, social and nutritional advances in association to the new technology and discoveries in medicine as well as the improvement in health care quality and accessibility offered to our population. With the prolongation of life of the population, more persons reach ages where cardiovascular disease occur.

The National Vital Statistics of the United States for the year 2000 showed a life expectancy at birth for both sexes of 76.9% years; 74.1 for males and 79.5 years for females

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**Table 2.** Puerto Rico 2001: Life Expectancy at Birth by Sex

| Year | Male  | Female | Both Sexes |
|------|-------|--------|------------|
| 1910 | 37.72 | 38.64  | 38.17      |
| 1920 | 38.18 | 38.85  | 38.46      |
| 1930 | 40.07 | 41.46  | 40.65      |
| 1940 | 45.07 | 45.11  | 46.01      |
| 1950 | 59.45 | 62.43  | 60.85      |
| 1960 | 67.14 | 71.88  | 69.36      |
| 1970 | 68.96 | 75.18  | 71.97      |
| 1980 | 69.88 | 76.87  | 73.11      |
| 1990 | 69.74 | 78.50  | 74.05      |
| 2000 | 72.28 | 79.90  | 76.12      |

Source: Department of Health. ASPESIS. Division of Statistics, San Juan, PR Reference (3).

as seen in Table 3. In Puerto Rico for the year 2000 life expectancy was 76.1 for both sexes; 72.3 for males and 79.9 for females. The figures for the female in United States and Puerto Rico are almost identical, being among the best figures around the world.

**Table 3.** Life Expectancy at Birth by Sex: (year 2000)  
United States and Puerto Rico

|               | Both Sexes | Male | Female |
|---------------|------------|------|--------|
| Unites Status | 76.9       | 74.1 | 79.5   |
| white         | 77.4       | 74.8 | 80.0   |
| black         | 71.8       | 68.3 | 75.0   |
| Puerto Rico   | 76.1       | 72.3 | 79.9   |

Sources: National Vital Statistics Vol. 4 No. 12, October 2001; Informe Anual Estadísticas Vitales 2001, Junio 2003

### Deaths by Specific Causes

For the last 40 years, diseases of the heart has ranked as the first cause of death in Puerto Rico and cancer has been second. For the first time in our recent history, since 2002 cancer ranks as the 1<sup>st</sup> cause of death and diseases of the heart ranks second. (Table 4). The Annual Report of Vital Statistics of Puerto Rico has shown a decrease in the deaths from heart disease since 1999. It its due to the use

**Table 4.** Deaths By Specific Causes Puerto Rico, 1998-2002

| Year | Population | Heart Disease: Rate <sup>1</sup> | Cancer: Rate | Cerebrovascular: Rate | Hypertensives: Rate |       |      |       |      |
|------|------------|----------------------------------|--------------|-----------------------|---------------------|-------|------|-------|------|
| 2002 | 3,858,806  | 4,637                            | 120.2        | 4,771                 | 123.6               | 1,103 | 28.6 | 1,651 | 42.8 |
| 2001 | 3,839,810  | 5,181                            | 134.2        | 4,696                 | 122.3               | 1,197 | 31.2 | 1,679 | 43.7 |
| 2000 | 3,816,901  | 5,222                            | 136.8        | 4,693                 | 123.0               | 1,166 | 30.5 | 1,575 | 41.3 |
| 1999 | 3,886,425  | 5,364                            | 138.0        | 4,429                 | 114.0               | 1,266 | 32.6 | 1,617 | 41.6 |
| 1998 | 3,833,482  | 6,038                            | 157.5        | 4,658                 | 121.5               | 1,420 | 37.0 | 1,395 | 36.4 |

<sup>(1)</sup> Rate per 100,000 inhabitants. The population of 1998 and 1999 is based on the 1990 census. That of 2000 and after is based on the 2000 census.  
Source: Department of Health, San Juan, Puerto Rico

of the new classification for deaths established by ICD-10, substituting the ICD-9 classification previously used. With the ICD-9, used until 1998, some causes of death related to hypertension were classified as heart disease deaths. ICD-10 generated a decrease in heart disease deaths and an increase in hypertensive diseases deaths as compared to the ICD-9 adjudication of deaths.

Table 4 illustrates, besides the relationship of heart disease deaths to cancer deaths, other related vascular conditions such as cerebrovascular diseases and hypertensive diseases from 1998 to 2002. It should be noted that the number deaths of hypertensive diseases increased since 1999 with the change in the ICD codification. In the year 2002, where the deaths of diseases of the heart were lower than those of cancer, with the addition of hypertensive diseases to the cardiac deaths, the number of cardiovascular deaths went up to 4,637 + 1,651 for a total of 6,288 in 2002, while there were only 4,771 deaths due to cancer.

Among all the cardiovascular deaths, the most frequently encountered is coronary artery disease. Clinically, we may encounter coronary artery disease as acute coronary syndrome, principally as unstable angina and non-ST-segment elevation myocardial infarction (NSTEMI) and ST segment elevation myocardial infarction (STEMI) or as chronic coronary artery disease. In some instances, the clinical picture of the illness is that of a patient suffering from congestive heart failure, which is the most common cause of death in elderly patients in the United States. Coronary artery disease and some of its clinical manifestations, including arrhythmias, is responsible for most of the cardiovascular services rendered in Puerto Rico.

### Institutions Offering Surgical and Medical Interventional Services

There are seven institutions in Puerto Rico where patients can have both medical and surgical interventional procedures performed such as by-pass surgery and cardiac catheterization and angioplasties. These seven institutions

as of 2003 are: Auxilio Mutuo Hospital in Hato Rey, the Advanced Cardiology Center in Mayagüez, the Cardiovascular Center of Puerto Rico and the Caribbean in Rio Piedras, PR, the Pavia Heart and Lung Center in San Juan, San Pablo Hospital in Bayamón, the Cardiovascular Institute of San Lucas Hospital Episcopal in Ponce and the Veterans Affairs Medical Center in San Juan.

### **Invasive Cardiovascular Services Rendered in 2003 in Puerto Rico**

Table 5 illustrates the total invasive procedures performed in these seven centers in the year 2003. Besides the data presented in Table 5, two other hospitals also performed diagnostic cardiac catheterizations in 2003. The Damas Hospital in Ponce reported 839 cardiac catheterizations and San Cristobal Hospital, also in Ponce 325. A total of 18,279 cardiac catheterizations were performed in Puerto Rico in 2003, as well as 2,972 by-pass surgical procedures and 5,087 angioplasties. Of the 18,279 patients catheterized, only 8,059 received either a by-pass or interventional medical procedures such as coronary angioplasties. In Puerto Rico there are 15 cardiac surgeons,

Cardiovascular Center of Puerto Rico, where 49 patient are presently alive out of the 53 adult cardiac transplantations.

### **Cardiovascular Postgraduate Training**

In the academic year 2003-2004 there are only two accredited adult Cardiovascular Training Programs in Puerto Rico. One at the Section of Cardiology of the Department of Medicine of the University of Puerto Rico, with 3 positions for fellows for each year of training. It uses as its main teaching institution the Cardiovascular Center of Puerto Rico and the Caribbean. The other adult program is at the Veterans Affairs Medical Center, with two positions per year for a total of 6 Fellows. There are no training programs for Cardiac Surgery nor for the training of Pediatric Cardiologists in Puerto Rico. There are no programs in Puerto Rico for training in the added competencies of Electrophysiology and Interventional Cardiology. This two cardiological subspecialties are recognized by the Accreditation Council on Graduate Medical Educational (ACGME). Although the ACGME does not recognize an added competence in congestive

**Table 5.** Diagnostic and Therapeutic Invasive Cardiovascular Procedures in Puerto Rico Hospitals (2003)

|  | <b>AuxilioMutuo Hospital</b> | <b>CVCPR</b> | <b>Advanced Cardiology Center</b> | <b>Pavia Heart &amp; Lung</b> | <b>San Lucas Hospital</b> | <b>San Pablo Hospital</b> | <b>Veterans Affairs Medical Center</b> | <b>Total</b> |
|--|------------------------------|--------------|-----------------------------------|-------------------------------|---------------------------|---------------------------|--|--------------|
| By-pass surgery                          | 175                          | 1,038        | 356                               | 177                           | 572                       | 504                       | 150                                    | 2,972        |
| Catheterization and Coronary angiography | 967                          | 5,786        | 2,553                             | 1,390                         | 2,792                     | 2,905                     | 662                                    | 17,055       |
| Coronary angioplasties                   | 256                          | 1,210        | 507                               | 611                           | 1,878                     | 530                       | 95                                     | 5,087        |
| Coronary stents                          | 323                          | 1,214        | 544                               | 544                           | 2,535                     | 507                       | --                                     | 5,705        |
| Pediatric surgery                        | --                           | 375          | --                                | --                            | --                        | --                        | --                                     | 375          |
| Electrophysiological studies             | --                           | 425          | --                                | --                            | --                        | --                        | 38                                     | 463          |
| IVUS                                     | --                           | --           | --                                | --                            | --                        | --                        | --                                     | 324          |

CCVPR- Cardiovascular Center of Puerto Rico and the Caribbean

ACC- Advanced Cardiology Center in Mayagüez includes catheterizations done at Perea and Bella Vista Hospitals in Mayagüez

3 electrophysiologists and between 25 to 30 cardiologists that do angioplasties.

Pediatric cardiac surgery was performed only in the Puerto Rico Cardiovascular Center as well as electrophysiological studies (EPS) and ablations. Some EPS were done at the Veterans Affairs Medical Center and at the Auxilio Mutuo Hospital since late 2003 and the beginning of 2004. Intravascular ultra sonography (IVUS) is done only at the Cardiovascular Institute of San Lucas Hospital Episcopal in Ponce. No information was obtained concerning pacemakers and defibrillators installed in Puerto Rico. A Heart Transplant Program is conducted at the

heart failure and heart transplant, a limited number of institutions in the United States offer a one year post graduate training in this area. Presently, young physicians in Puerto Rico interested in obtaining training in cardiac surgery, pediatric cardiology, electrophysiology, interventional cardiology and on congestive heart failure-heart transplant programs must do so in the United States.

### **Discussion**

The life expectancy at birth has consistently increased in Puerto Rico in the last 50 years. Concurrently, in the

last 40 years there has been an increase in the number of persons suffering from cardiovascular disease, being heart disease the main cause of death for our population. For the first time, in 2002, heart disease was not reported by the Division of Statistics of the Department of Health of Puerto Rico as the first cause of death in our island. This place has been taken by cancer, which in the past usually ranked as the second cause of death. This is mainly due to the fact that since 1999 the ICD-10 code is used for establishing the cause of death while prior to that the statistics were based on the ICD-9 coding system. The change from ICD-9 to ICD-10 causes a decrease in the number of heart disease deaths as it transfers some previously considered heart disease deaths to hypertensive deaths. If in the year 2002, the 4,637 heart disease deaths are added to the 1,651 hypertensive deaths, the cardiovascular deaths will be greater than cancer deaths (4,771).

In Puerto Rico there are 7 institutions in which cardiac surgery, cardiac catheterization and angioplasties are performed. We have presented the volume of such procedures carried in each of those institutions, the data presented was obtained from their staff, by the members of each faculty concerned. The use of tables presenting the correct numbers and statistics about these different aspects of the actual situation of cardiology in Puerto Rico allows us to have clear ideas regarding the status of cardiovascular diseases in Puerto Rico in 2003. We expect that this information might be helpful in the decision-making process for the management of heart disease in Puerto Rico in the near future.

### **Resumen**

Por los últimos 40 años las enfermedades del corazón han sido la primera causa de muerte en Puerto Rico y el cáncer ha sido la segunda. En las Estadísticas Vitales del Departamento de Salud para el año 2002, el cáncer es informado como la primera causa de muerte y las enfermedades del corazón como la segunda. Este cambio inesperado se debe principalmente a que la nueva clasificación ICD-10 sustituyó, desde el 1999, la clasificación ICD-9 usada previamente para adjudicar

muertes donde algunas de ellas, relacionadas a la hipertensión se catalogaban como muertes por enfermedades del corazón. El uso del ICD-10 ha generado una disminución en las muertes cardiovasculares y un aumento en las muertes por enfermedades hipertensivas al compararlas con la adjudicación de muertes por ICD-9. Si en el año 2002 se suman las muertes adjudicadas a enfermedades del corazón a las muertes por enfermedades hipertensivas el total de muertes cardiovasculares es mayor que el total de las muertes por cáncer. Se incluye además, información relevante sobre la esperanza de vida al nacer, estadísticas de causas específicas de muerte en los últimos años y estadísticas sobre servicios de procedimientos cardiovasculares invasivos, tanto médicos como quirúrgicos, rendidos en el año 2003 en Puerto Rico. Se presentan las alternativas para educación postgraduada de cardiología en nuestro país..

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