Estimation of the Supply and Demand for Cardiologists in Argentina

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SUMMARY

Introduction

To plan the necessary human resources in cardiology, we should know the number and distribution of cardiologists throughout the country, so as to adapt the supply of professionals to the demand of the population.

Objectives

To estimate the number of cardiologists on active duty in Argentina; to relate it to the number of inhabitants; to compare this index to the index in other countries; and to determine an optimal recommended number of cardiologists per million of inhabitants, in order to improve the balance between supply and demand of professionals; as well as to estimate the number of in-training cardiologists from residency programs.

Material and Methods

In 2007, a search in different sources was carried out to determine the number of cardiologists on active duty in the country. The total number –and the number per province– was estimated using the register of fellow cardiologists of the *Sociedad Argentina de Cardiología* and the *Federación Argentina de Cardiología*, and also including the specialists registered in the Medical Associations in the country. The number of in-training cardiologists was provided by the *Comisión Nacional de Residentes de Cardiología*. The optimal reference value was defined as the recommended number of cardiologists per million inhabitants, determined on the basis of a model of demand.

Results

The number of cardiologists was estimated in 7,468 professionals, which represented a relation of 195 cardiologists per million inhabitants, 4.5 times higher than the optimal recommended relation (1,720 cardiologists in all for the whole country, or 43 cardiologists per million inhabitants). Of those, 51% cardiologists work in Buenos Aires city and in the province of Buenos Aires. The number of physicians training in cardiology all over the country was 792 (from 1st to 4th years), that is, 21 in-training cardiologists per million inhabitants.

Conclusions

This study served the purpose of estimating the number of cardiologists in Argentina, and its relationship with the needs of the population, according to a model of demand. Although the design of this work could encounter various limitations, the number of cardiologists per million inhabitants seems to far surpass the indexes found and recommended in Europe and in the United States. The same surplus is present in the individual analysis of each province, and in the number of new in-training cardiologists.
This information could be useful in guiding the educational role of the scientific societies regarding the planning of resources in the specialty.

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Key words > Physicians - Cardiology - Planning - Argentina

BACKGROUND

To plan the necessary human resources in cardiology in Argentina, we should know the number and distribution of cardiologists throughout the country, so as to adapt the supply of professionals to the demand of the population. This information is extremely important not only for education centers with cardiology

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training programs but also for young physicians who have to choose among several specialties for their future practice.

Although there are no local studies reporting the number of cardiologists in Argentina, it seems that this figure, indirectly estimated, is excessive in relation with the population size. In fact, the presence of an exaggerated number of physicians allows us to believe a similar behavior for cardiologists in Argentina.

Cardiovascular diseases remain the most important health problem facing developed and developing countries; for this reason, the balance between the supply and demand for cardiologists is a matter of care and analysis worldwide. (1-3) Recently, the European Conference on the Future of Cardiology (4) anticipated a shortage of cardiologists in most European countries and in North America; thus changes in the organizational model of healthcare and in training schemes of future cardiologists should take place. (3, 5) In this sense, the situation in Argentina might be quite different as there is an excessive number of cardiologists who not only treat patients referred to them for specialized consultation but also serve as primary healthcare physicians.

The goals of this study were to estimate the number of cardiologists on active practice in Argentina; to relate it to the number of inhabitants; to compare this index to the index in other countries; and to determine an optimal recommended number of cardiologists per million inhabitants, in order to improve the balance between the supply and demand of professionals, as well as to estimate the number of in-training cardiologists from residency programs.

MATERIAL AND METHODS

In 2007, a search in different sources was carried out to determine the number of cardiologists on active practice in Argentina. The first hypothesis of this study was that the surplus of cardiologists nationwide was such that a possible overestimation or underestimation of the total number would not significantly affect the final result of this research.

The total number –and the number by province–of cardiologists was estimated using the register of cardiologists who are fellow members of the Argentine Society of Cardiology and the Argentine Federation of Cardiology, and also the specialists registered in the Medical Associations in the country. Data regarding population per province and the distribution by age groups were obtained from the *Instituto Nacional de Estadística y Censos* (INDEC, National Institute of Statistics and Censuses) and from the Ministry of Health of the Nation. (6) Information from publications by Block et al. (1) and Eurostat registered medical specialists were adapted to perform comparisons with international data. (7) The number of in-training cardiologists was provided by the CONAREC (*Comisión Nacional de Residentes de Cardiología,* National Council of Residents in Cardiology) for the same period.

Data were presented as number of cardiologists per million inhabitants. The optimal reference value was defined as the recommended number of cardiologists per million inhabitants, determined on the basis of the following model of demand: (2)

Number of cardiologists per 100 000 inhabitants:

0 to 14 years:	1 cardiologist
15 to 44 years:	4 cardiologists
46 to 64 years:	7 cardiologists
≥ 65 years:	9 cardiologists

Finally, we calculated the variation in percentage between the number of cardiologists observed and the recommended one as optimal reference value.

RESULTS

The total number of cardiologists in 2007 was estimated in 7468 professionals, which represented a relation of 195 cardiologists per million inhabitants, 4.5 times higher than the optimal recommended relation (1720 cardiologists nationwide, or 43 cardiologists per million inhabitants) Figure 1 shows the comparison between the number of cardiologists per million inhabitants in Europe, United States and Argentina. Our country has the greatest rate of specialists per million inhabitants, only surpassed by Greece.

The proportional distribution by province is illustrated in Figure 2: 51% of cardiologists work in the city of Buenos Aires and in the province of Buenos Aires. Figure 3 demonstrates the number of cardiologists in each province and the optimal value recommended, expressed per million inhabitants. The percentages associated with each pair of bars correspond to the excess of cardiologists over the optimal value suggested. According to the model of demand, the number of cardiologists was 0.7 times greater in the Chaco and 24 times greater in the city of Buenos Aires.

The absolute number of in-training cardiologists from residency programs nationwide was 792, including residents from 1st st to 4th year, which corresponds to 21 trainees per million inhabitants. Figure 4 shows the distribution of residents in cardiology by province.

DISCUSSION

This study could estimate the number of cardiologists in Argentina and their relation with the needs of the population according to a model of demand. Although the design of this study might have some limitations, the number of cardiologists per million inhabitants seems to surpass the indexes found and recommended in Europe and the United States. The same surplus is seen in the individual analysis by province and in the number of trainees. In Argentina, there are 21 residents in cardiology per million inhabitants, whereas in the United States this number was 8 residents per million in the period 2000-2003. (3)

Current and future demands for cardiologists depend on several dynamic population factors. (3) Firstly, elderly population that lives longer, with more preva-

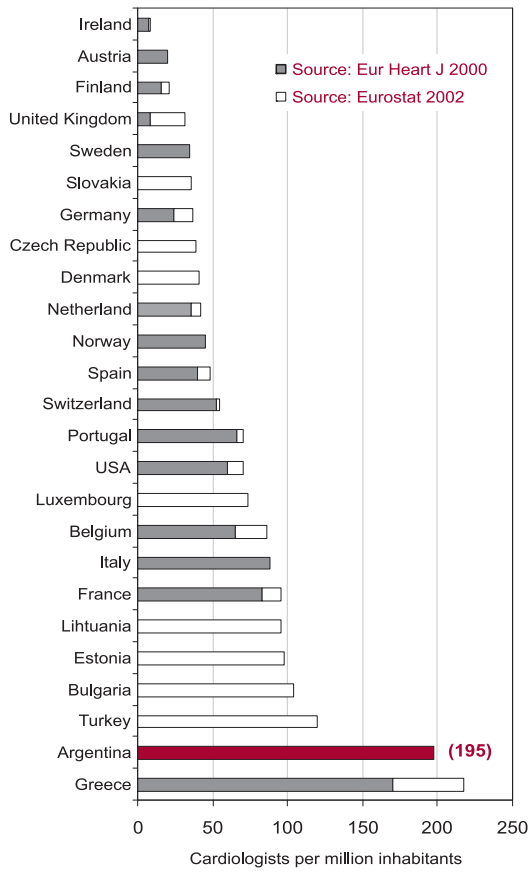

Fig. 1. Number of cardiologists per million inhabitants in Europe, United States and Argentina Cumulative bars correspond to data retrieved from two different sources (references 1 and 7). For Argentina, data corresponds to the estimation for the year 2007 according to different sources.

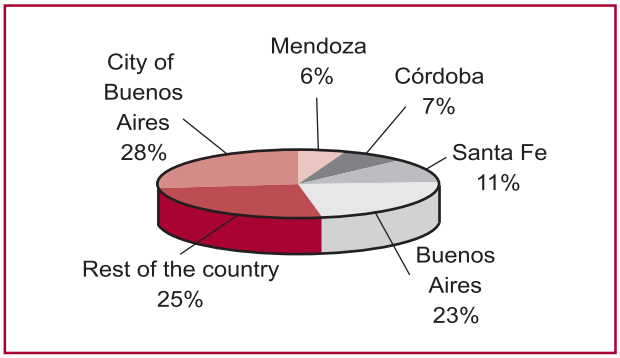

Fig. 2. Proportional distribution of 7468 patients by Argentine provinces.

lence of chronic heart diseases such as congestive heart failure. Epidemics of obesity and type 2 diabetes mellitus, isolated or associated with metabolic syndrome, is another factor that enhances cardiovascular problems. Secondly, the population has better information and demands greater medical care from specialists; in addition, there is evidence that patients with heart diseases treated by cardiologists have better outcomes than those under the care of other physicians. Other factors related to increase in cardiology consultations include failure of managed care to prevent patients' access to specialists, growing use of cardiovascular screening tests for diseases and risk factors and, in particular, the fact that more women are aware that they are more likely to die of cardiovascular disease than cancer. Finally, subspecialization triggered by the permanent technological evolution and its rapid diffusion towards clinical practice encourages cardiologists to be more active in daily practice decision-making.

From another perspective, the appropriate number of cardiologists depends on the how professional duties are defined and the "need" of cardiology departments in order to improve the health of the population, considering the prevalence of cardiovascular diseases and health care policy priorities. Thus Canada recommends about 3.8 cardiologists per 100 000 inhabitants, (8) but in this country general practitioners and internists take on many of the professional responsibilities and tasks that, in Argentina, would correspond to cardiologists, such as primary and secondary prevention. Planning human resources requires considering these aspects of cardiology practice. For example France, Italy and Greece exhibit the greatest rates of cardiologists per 1 000 000 inhabitants in Europe; however, these specialists undertake almost all cardiological procedures and are solely responsible for the management of patients with heart disease. On the contrary, in most other European countries these patients are managed by clinicians and general practitioners, who perform some cardiological procedures, for example, ECG, exercise stress tests and sometimes even echocardiography. In a few countries, for example England and Ireland, cardiologists work in large hospitals and are mostly concerned with the management of patients with more severe heart disease. In these latter countries, many exclusively undertake the more sophisticated cardiological procedures, such as angioplasty and electrophysiology tests.

Although it might seem paradoxical, a few studies demonstrate that the need for cardiologists tends to increase when the health system manages to lower cardiovascular mortality. (2) This is due not only to the necessity of a greater number of cardiologists in active practice but also to the fact that someone who has suffered an infarction becomes a cardiology patient for the rest of his or her life.

There is evidence that suggests that the number of cardiologists in a region or country is associated with a greater indication of invasive procedures such

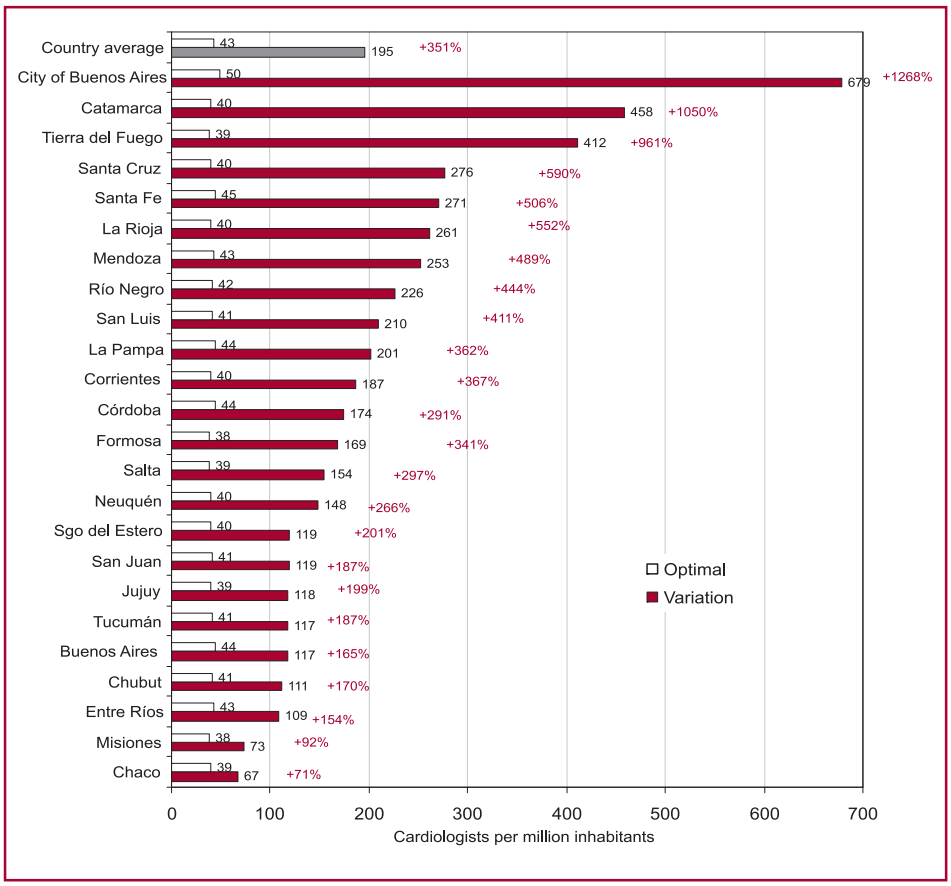

Fig. 3. Number of cardiologists observed and optimal value recommended expressed per million inhabitants and by each Argentine province. The percentages associated with each pair of bars correspond to the excess of cardiologists over the optimal value suggested.

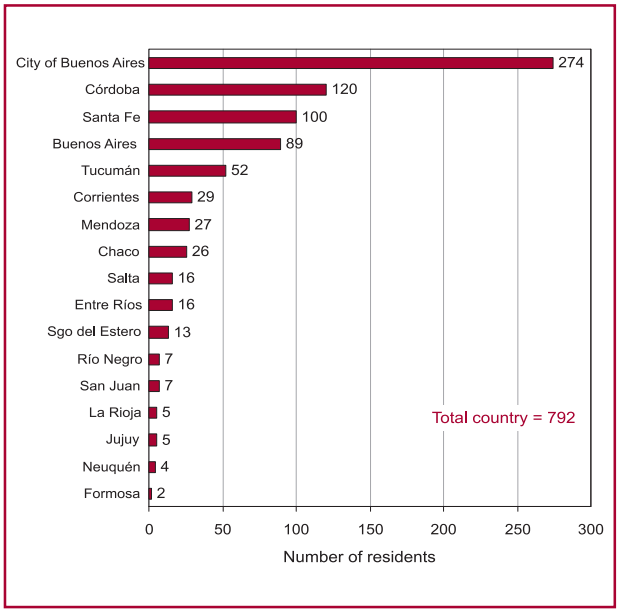

Fig. 4. Absolute number of in-training cardiologists from residency programs nationwide corresponding to all residents from 1st to 4th year. The missing provinces do not have residency programs in the specialty.

as cardiac catheterization and angioplasty. (9) In addition, a greater number of cardiologists might improve the outcomes of medical care. Patients treated by cardiologists have lower in-hospital mortality for acute myocardial infarction than those attended by physicians of other disciplines (10, 11) and those admitted at hospitals with cardiology departments have better outcomes compared to hospitals without such departments. (12) Patients hospitalized for heart failure receive better evidence-based care and have better outcomes if attended by cardiologists compared with physicians of other disciplines. (13, 14)

Several factors may be responsible for the excessive number of cardiologists in Argentina compared to the rest of the countries. On the one hand, there is an excess of physicians per million inhabitants in our country compared to other countries and, subsequently, the number of cardiologists might be proportional to this overpopulation of physicians. On the other hand, the development and growth of coronary care units might have had a key role in the demand of cardiologists in the last 25 years. Finally, other determinants might be the presence of prestigious schools of clinical cardiology in Argentina and the fact that cardiology subspecialties are better remunerated.

Determining the number of cardiologists needed in a community is not a simple task. The role of the cardiologist as a healthcare provider of an aged population with its corresponding burden of diseases will determine the demand of professionals. Subspecialization in the field of echocardiography, interventional cardiology and electrophysiology might depend on the needs of the health care system for these procedures. However, an excessive number of cardiologists trained in these subspecialties might generate a dangerous over-supply with subsequent overprovision, income drops and professional dissatisfaction

Study Limitations

The estimation of the number of cardiologists presented in this study is only a reasonable approximation. There are no governmental official data to compare against this information. Local pharmaceutical industry coincides with a number of about 8000 cardiologists. Data retrieved from the register of fellow cardiologists of the Argentine Society of Cardiology and the Argentine Federation of Cardiology might underestimate the real number. The same might be applied to data from Medical Associations in the country. Anyway, this number might serve as a first approach to face the problem of the supply of cardiologists. Another limitation might be related to the fact that this study did not consider the different cardiology subspecialties. In addition, as the number of in-training physicians does not take into account those who are not in a residency program or those who attend postgraduate cardiology courses, the number of future cardiologists might be even higher. Finally, the model of demand chosen might underestimate the need for cardiologists due to the role these specialists play in primary health care in Argentina.

CONCLUSIONS

This study could estimate the number of cardiologists in Argentina and their relation with the needs of the population according to a model of demand. Although the design of this study might have some limitations, the number of cardiologists per million inhabitants seems to surpass the indexes found and recommended in Europe and the United States. The same surplus is seen in the individual analysis by province and in the number of trainees.

This information might serve to orientate the educational role of scientific societies in planning the resources of the specialty.

RESUMEN

Estimación de la oferta y la demanda de cardiólogos en la Argentina

Introducción

Para planificar los recursos humanos necesarios en cardiología se deben conocer la cantidad y la distribución de los médicos cardiólogos en todo el país, a fin de adecuar la oferta de profesionales a la demanda de la población.

Objetivos

Estimar el número de cardiólogos en actividad en la Argentina, relacionarlo con la cantidad de habitantes, comparar este índice con el de otros países y determinar una cantidad óptima recomendada de cardiólogos por millón de habitantes a fin de mejorar el equilibrio entre la oferta y la demanda de profesionales, así como estimar la cantidad de cardiólogos en formación en los programas de residencias.

Material y métodos

Durante 2007 se realizó una búsqueda en distintas fuentes para determinar el número de cardiólogos en actividad en el país. El número total y por provincia se estimó a través de los padrones de socios cardiólogos de la Sociedad Argentina de Cardiología, la Federación Argentina de Cardiología y de especialistas inscriptos en los Colegios Médicos el país. La cantidad de cardiólogos en formación se obtuvo de la Comisión Nacional de Residentes de Cardiología. El valor óptimo de referencia se definió como la cantidad reco-mendada de cardiólogos por millón de habitantes, deter-minada a partir de un modelo de demanda.

Resultados

La cantidad de cardiólogos se estimó en 7.468 profesionales, lo que representó una relación de 195 cardiólogos por millón de habitantes, 4,5 veces más que la relación óptima recomendada (1.720 cardiólogos en total para todo el país o 43 cardiólogos por millón de habitantes). El 51% de los cardiólogos se concentran en la ciudad de Buenos Aires y en la provincia de Buenos Aires. El número de médicos en residencias de cardiología de todo el país fue de 792 (1ro a 4to año), correspondiente a 21 cardiólogos en formación por millón de habitantes.

Conclusiones

En este estudio se pudo estimar el número de cardiólogos en la Argentina y su relación con las necesidades de la población de acuerdo con un modelo de demanda. Aunque el diseño de este trabajo podría presentar varias limitaciones, la cantidad de cardiólogos por millón de habitantes parece que supera ampliamente los índices hallados y recomendados en Europa y los Estados Unidos. El mismo excedente se presenta en el análisis individual por provincia y en la cantidad de nuevos cardiólogos en formación.
Esta información podría servir para orientar el papel formativo de las sociedades científicas en la planificación de recursos de la especialidad.

Palabras clave > Médicos - Cardiología - Planificación - Argentina

BIBLIOGRAPHY

1. Block P, Petch MC, Letouzey JP. Manpower in cardiology in Europe. The Cardiology Monospeciality Section of the UEMS. Eur Heart J 2000;21:1135-40.

2. De Teresa Galván E, Alonso-Pulpón L, Barber P, Bover Freire R, Castro Beiras A, Cruz Fernández JM, et al. Imbalance between the supply and demand for cardiologists in Spain. Analysis of the current situation, future prospects, and possible solutions. Rev Esp Cardiol 2006;59:703-17.

3. Fye WB. 35th Bethesda Conference. Introduction: The origins and implications of a growing shortage of cardiologists. J Am Coll Cardiol 2004;44:221-32.

4. Escaned J, Rydén L, Zamorano JL, Poole-Wilson P, Fuster V, Gitt A, et al, on behalf of the participants in the European Conference on the Future of Cardiology. Trends and contexts in European cardiology practice for the next 15 years. The Madrid Declaration; a report from the European Conference on the Future of Cardiology, Madrid, 2-3 June 2006. Eur Heart J 2007;28:634-7.
5. Block P, Weber H, Kearney P. Cardiology section of the UEMS. Manpower in cardiology II in Western and Central Europe. Eur Heart J 2003;24:299-310.
6. Indicadores básicos. Argentina 2006. Ministerio de Salud de la Nación. OPS, 2006.
7. Registered medical specialists. Absolute numbers and rate per 100,000 inhabitants Eurostat. Disponible en: http://epp.eurostat.cec.eu.int
8. Tu K, Gong Y, Austin PC, Jooakimanian L, Tu JV. A overview of the types of physicians treating acute cardiac conditions in Canada. Can J Cardiol 2004;20:282-91.
9. Philbin EF, Jenkins PL. Differences between patients with heart failure treated by cardiologists, internists, family physicians, and other physicians: analysis of a large, statewide database. Am Heart J 2000;139:491-6.
10. Casale PN, Jones JL, Wolf FE, Pei Y, Eby LM. Patients treated by cardiologists have lower in-hospital mortality for acute myocardial infarction. J Am Coll Cardiol 1998;32:885-9.
11. Ayanian JZ, Landrum MB, Guadagnoli E, Gaccione P. Specialty of ambulatory care physicians and mortality among elderly patients after myocardial infarction. N Engl J Med 2002;347:1678-86.
12. Gottwik M, Zahn R, Schiele R, Schneider S, Gitt AK, Fraunberger L, et al. Differences in treatment and outcome of patients with acute myocardial infarction admitted to hospitals with compared to without departments of cardiology; results from the pooled data of the Maximal Individual Therapy in Acute Myocardial Infarction (MITRA 1+2) Registries and the Myocardial Infarction registry (MIR). Eur Heart J 2001;22:1794-801.
13. Jong P, Gong Y, Liu PP, Austin PC, Lee DS, Tu JV. Care and outcomes of patients newly hospitalized for heart failure in the community treated by cardiologists compared with other specialists. Circulation 2003;108:184-91.
14. Bellotti P, Badano LP, Acquarone N, Griffo R, Lo PG, Maggioni AP, et al. Specialty-related differences in the epidemiology, clinical profile, management and outcome of patients hospitalized for heart failure: the OSCUR study. Outcome dello Scompenso Cardiaco in relazione all'Utilizzo delle Risore. Eur Heart J 2001;22:596-604.