

Special article

Spanish Cardiac Catheterization and Coronary Intervention Registry. 20th Official Report of the Spanish Society of Cardiology Working Group on Cardiac Catheterization and Interventional Cardiology (1990-2010)

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ABSTRACT

Introduction and objectives: The Working Group on Cardiac Catheterization and Interventional Cardiology presents on a yearly basis a report on the data collected for the national registry. This information displays how procedures are distributed throughout Spain and makes comparisons with other countries feasible.

Methods: Institutions render their data voluntarily (online) and they are analyzed by the Working Group's steering committee.

Results: Data was sent by 113 hospitals (71 public and 41 private) that treat mainly adults, reporting 135 486 diagnostic procedures, 119 118 of them coronary angiograms, slightly less than the year before, and with a rate of 2945 coronary angiograms per million inhabitants. Percutaneous coronary interventions increased a bit, to 64 331 procedures and a rate of 1398 interventions per million. Of 100 371 stents implanted, 61.3% were drug-eluting stents. In the acute phase of myocardial infarction, 14 248 coronary interventions were carried out, 6% more than in 2009 and 22% of the total number of coronary interventions. The most frequent intervention for adult congenital heart disease was closure of an atrial septal defect (295 procedures). Percutaneous mitral valvuloplasty continues to decrease (326 procedures) and percutaneous aortic valve implantations are growing rapidly, with 655 units implanted in 2010.

Conclusions: The greatest increase in activity has occurred in the field of myocardial infarction and percutaneous aortic valve implantation. The other procedures, both diagnostic and therapeutic, remain stable.

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Registro Español de Hemodinámica y Cardiología Intervencionista. XX Informe Oficial de la Sección de Hemodinámica y Cardiología Intervencionista de la Sociedad Española de Cardiología (1990-2010)

RESUMEN

Introducción y objetivos: La Sección de Hemodinámica y Cardiología Intervencionista presenta su informe anual con los datos del registro de actividad nacional correspondientes a 2010. Esta información permite conocer la distribución nacional del intervencionismo cardíaco y ofrece datos para compararlo con el de otros países.

Métodos: Los centros proporcionan sus datos de forma voluntaria. La información se introduce *online* y la analiza la Junta Directiva de la Sección de Hemodinámica.

Resultados: Enviaron sus datos 113 hospitales (71 públicos y 42 privados) que realizan su actividad predominantemente en adultos. Se realizaron 135.486 estudios diagnósticos; las 119.118 coronariografías suponen una ligera reducción respecto al año anterior, con una tasa de 2.945 coronariografías/millón de habitantes. Los procedimientos intervencionistas coronarios aumentaron ligeramente, hasta alcanzar los 64.331 (1.398 intervenciones/millón de habitantes). Se implantaron 100.371 *stents*, de los cuales el 61,3% fueron farmacoactivos. Se llevaron a cabo 14.248 procedimientos en el infarto agudo de miocardio, lo que supone un incremento del 6% respecto a 2009 y representa el 22% del total de intervenciones coronarias percutáneas. El intervencionismo más frecuente (295 procedimientos) en las cardiopatías congénitas del adulto es el cierre de la comunicación interauricular. La valvuloplastia mitral sigue en descenso, con 326 casos. El implante de válvulas aórticas percutáneas crece exponencialmente, con 655 unidades implantadas en 2010.

Palabras clave:

Registro

Cateterismo cardíaco

Stent

Cierre de comunicación interauricular

Válvula aórtica percutánea

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Conclusiones: El aumento más importante en la actividad fue en relación con el infarto agudo de miocardio con elevación de ST y el implante percutáneo de válvulas; los demás procedimientos diagnósticos y terapéuticos se mantienen en fase de meseta.

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Abbreviations

AMI: acute myocardial infarction
ASD: atrial septal defect
DES: drug-eluting stent
PCI: percutaneous coronary intervention
TAVI: transcatheter aortic valve implantation

INTRODUCTION

Continuing an annual tradition that has been maintained for 2 decades, one of the tasks of the Board of the Spanish Society of Cardiology Working Group on Cardiac Catheterization and Interventional Cardiology is to collect data on the activity of as many cardiac catheterization laboratories as possible in order to complete the Annual Registry of Activity. Data collection has steadily improved,^{1–19} mainly due to inputting the data online. For the first time, 100% of the hospitals provided their data, thus making the analysis more reliable. The data for 2010 were presented to the members of the Working Group at its annual meeting, which was held June 16–17 in Valencia. The data are also available from the Working Group's website (<http://www.hemodinamica.com>).

The quality of the information obtained offers an overview of the current situation in Spain and allows for comparisons with other countries. It also provides a way to assess and compare the development of interventional cardiology in Spain's autonomous regions. The free availability of these data is of great help in understanding how resources are distributed and in assessing the different trends in the use of diagnostic and therapeutic procedures.

In 2010, as in 2009, we continue to highlight 3 aspects of particular interest in the registry. First, interventional cardiology has reached a plateau with minimal growth. Secondly, the growth observed last year in percutaneous coronary intervention (PCI) procedures for myocardial infarction, and especially primary angioplasties, continues to increase. This may be due to different reasons, but has been particularly influenced by the European Stent 4 Life initiative²⁰ which aims to improve the treatment of infarction, with Spain as one of their target countries.²¹ Several regions have joined this initiative this year, which has led to a significant increase in the number of primary PCIs. In fact, the increase in the number of infarct PCIs is the leading cause of the total increase in PCI. Finally, there is a continuing and marked increase in transcatheter aortic valve implantations (TAVI), both in the number of units implanted and the number of hospitals performing the technique. In addition, the Working Group has promoted the creation of a specific TAVI registry, whose preliminary data for 2010 were also presented to its members at the Valencia meeting.

This paper presents the 19th report on interventional activity in Spain and covers the activity of almost all public hospitals and much of the private sector.

METHODS

We collected data on diagnostic and interventional cardiovascular procedures in the majority of Spanish hospitals. Data collection was performed on a voluntary basis and was not audited. Each researcher was required to reassess the data if it was very inconsistent or if the values markedly differed from the trend in a given hospital in recent years. Data were collected using a standard electronic questionnaire accessed via the website of the Spanish Society of Cardiology Working Group on Cardiac Catheterization and Interventional Cardiology (<http://www.hemodinamica.com>) and was completed online. The data were analyzed by the Board of the Working Group in collaboration with the Persei company and are made public in this article.

Population-based calculations for Spain and each region were based on population estimates provided by the Spanish National Institute of Statistics for December 31, 2010, as published on its website (<http://www.ine.es>). The population of Spain at this time was 46 152 926 inhabitants (Fig. 1). Note that for the first time, the procedures per million population for Spain were based on the total population, since in previous years these rates were calculated by averaging the different provinces where interventional cardiology was available, rather than by using the total population. Although the difference may be small in relation to previous years, it appears to better illustrate the current situation. As in previous registries, hospitals were defined as public regardless of their source of funding, providing they served a particular area of the population within the public health system; other hospitals were considered to be private.

RESULTS AND DISCUSSION

Infrastructure and Resources

A total of 113 hospitals performing interventional procedures in adults participated in the present registry (13 less than the previous year), and of these hospitals 10 also performed these procedures in pediatric patients (Appendix 1). In total, 71 of 74 public hospitals and 42 of 114 private hospitals submitted their data, 10 fewer private hospitals than in 2009 but nearly all the public hospitals that perform interventional procedures in Spain. There were 175 cardiac catheterization laboratories, of which 112 (64%) were in public hospitals; 35 hospitals had 2 laboratories and 7 hospitals had 3 or more. A 24-hour emergency team was available in 68% of the hospitals and 69% performed cardiac surgery.

Regarding personnel, 113 hospitals reported having 441 physicians who performed interventional procedures in 2010 (342 of whom were accredited). In public hospitals (323 physicians), there were 4.5 physicians per hospital and 2.8 per cardiac catheterization laboratory; in private hospitals there were 1.8 physicians per hospital and 1.8 per laboratory. In total, 113 hospitals provided data on their nursing staff. There were 544 registered nurses and 98 radiology technicians, with an average of 3.8 registered nurses or radiology technicians per public hospital and 3.3 per private hospital.

Total España 46.152.926 (31-12-2010)

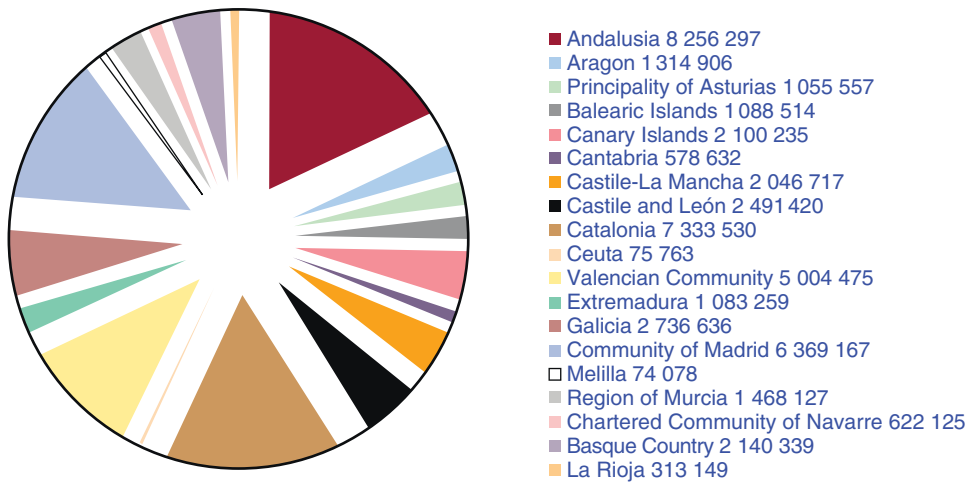


Figure 1. Population of Spain as of December 31, 2010. Source: National Institute of Statistics.

Diagnostic Procedures

During 2010, 135 486 diagnostic procedures were performed, which is the first time there has been a decrease (1.2%) compared to the previous year. In total, 119 918 coronary angiograms were performed, which was 3.2% fewer than in 2009 (the fact that 3 public hospitals and 10 private hospitals did not report these data as compared to the previous year may have influenced this result). Of these procedures, 24.9% were performed in women and 23% in patients older than 75 years, similar to the figures of last year. The national average was 2945 procedures per million population, taking into account the change in the way the averages were calculated, referred to above, representing an increase compared to 2009. This is still well below the most recent European average for 2005 of 4030 coronary angiograms per million population,²² or the latest data presented at the 2011 EuroPCR Congress of an average of more than 5500 coronary angiograms per million population in 2009.²³ Of note is the 19.6%

increase in the number of valve procedures, which is probably due to the increased number of TAVIs.

Figure 2 shows the distribution of all diagnostic procedures since 2000. In total, 62 hospitals performed more than 1000 coronary angiograms (7 more than in 2009), of which 21 performed more than 2000 (Fig. 3). There was an average of 1198 diagnostic procedures per hospital (774 per laboratory), which was virtually unchanged from previous registries.^{18,19} It is noteworthy that only 13 public hospitals (4 less than in 2009) performed fewer than 1000 coronary angiograms.

As mentioned, the national average was 2945 coronary angiograms per million population. Their distribution by region is shown in Figure 4. Compared to the previous year, the difference between the region performing the most coronary angiograms and the region performing the least was 1880.

Regarding intracoronary diagnostic techniques, the situation is similar to the previous year. Intravascular ultrasound (IVUS) was the most frequently used technique, followed by pressure

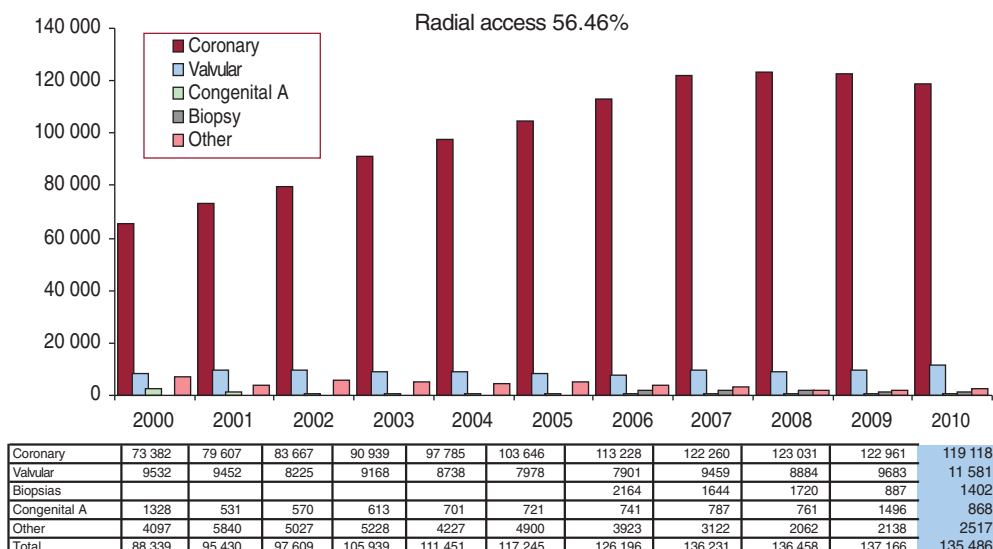


Figure 2. Evolution of the number and type of diagnostic procedures performed between 2000 and 2010.

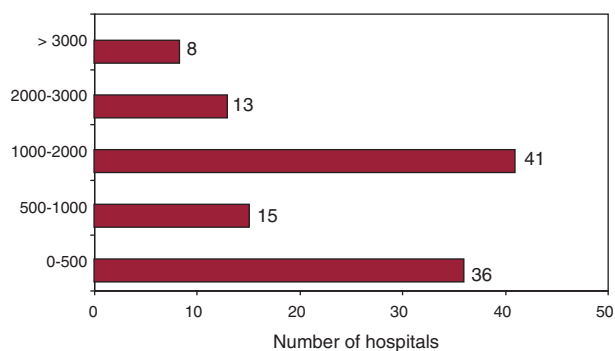


Figure 3. Distribution of hospitals according to the number of coronary angiograms.

guidewire. There was a slight reduction (0.8%) in the use of IVUS, whereas the use of pressure guidewire increased by 26.6% (its use had already increased by 17% last year). The use of optical coherence tomography increased considerably, from 327 cases in 2009 to 557 in 2010, whereas the use of intracoronary Doppler guidewire continued to decrease, with just 43 cases as compared to the 52 cases in 2009. Figure 5 shows the evolution of different intracoronary diagnostic techniques in recent years.

Regarding access routes, use of the radial artery continued to increase, as in previous years, and finally surpassed the use of the femoral artery. The radial artery was used in 56.5% of cases compared to 45% in 2009 (Fig. 1).

Coronary Intervention

All the hospitals that perform diagnostic procedures also perform PCI. Despite the reduction in coronary angiograms, the number of PCIs again increased slightly (1.9%), which was almost identical to the previous year (2%), with the current number standing at 64 331. The historical development of PCI is shown in Figure 6. The number of PCIs per million population was 1398 (compared to 1391 in 2009), but still far below the latest European figures, with a rate of in 1601 PCIs per million

population in 2005,²² or nearly 2000 per million population in 2009.²³ This places Spain last in Europe.

The ratio of PCIs to coronary angiograms grew by 3% and now stands at 0.5. The number of procedures for multivessel disease remained very stable compared to the previous year and represented 25.4% of all PCIs. The frequency of *ad hoc* procedures performed during diagnosis also remained stable at 77% (this stood at 76% a year before).

The distribution by sex and age was very similar to that of 2009 with 20.2% of PCIs performed in women (1% more than the previous year), and 23.3% of procedures performed in patients over 75 years of age (identical to the previous year). Restenosis was treated by PCI in 5.3% of cases (5.6% in 2009). The number of interventions for restenotic lesions remained relatively stable, which may be explained by the fact that a similar number of drug-eluting stents (DES) has been used in recent years.

The significant increase in PCIs for unprotected left main coronary artery disease continued, now standing at 2271 interventions. This was 15% more than last year, representing 3.5% of all PCIs (3.1% in 2009). There were 994 and 184 interventions, respectively, on the saphenous vein and mammary artery.

Glycoprotein IIb/IIIa inhibitors and adjunctive antithrombotic drug therapy was used in 13 869 procedures, representing 21.5% of PCI (very similar numbers to 2009): 62.7% with abciximab, 9.1% with tirofiban, 6.2% with eptifibatid and 22% with bivalirudin, whose use continued to increase compared to previous years.

Figure 7 shows the distribution by Spanish region of the 1398 PCIs per million population. The rate was slightly less than in 2009, decreasing from 836 to 793. Figure 8 shows the distribution per hospital, with 54 hospitals performing fewer than 500 PCIs per year (47%), although the majority of private hospitals were in this category; as in 2009, there were 17 hospitals in the high-volume (>1000) category.

Intracoronary diagnostic techniques (IVUS and pressure guidewire), which are mainly used to assess the severity of intermediate lesions or the outcome of the intervention, were similar in number to 2009, with IVUS and pressure guidewire representing 9.2% and 3.7% (more than 1% growth), respectively, of total PCIs.

Radial access in PCI (48.4%) grew by 3% and this was almost the same as femoral access. Regarding femoral access, vascular closure

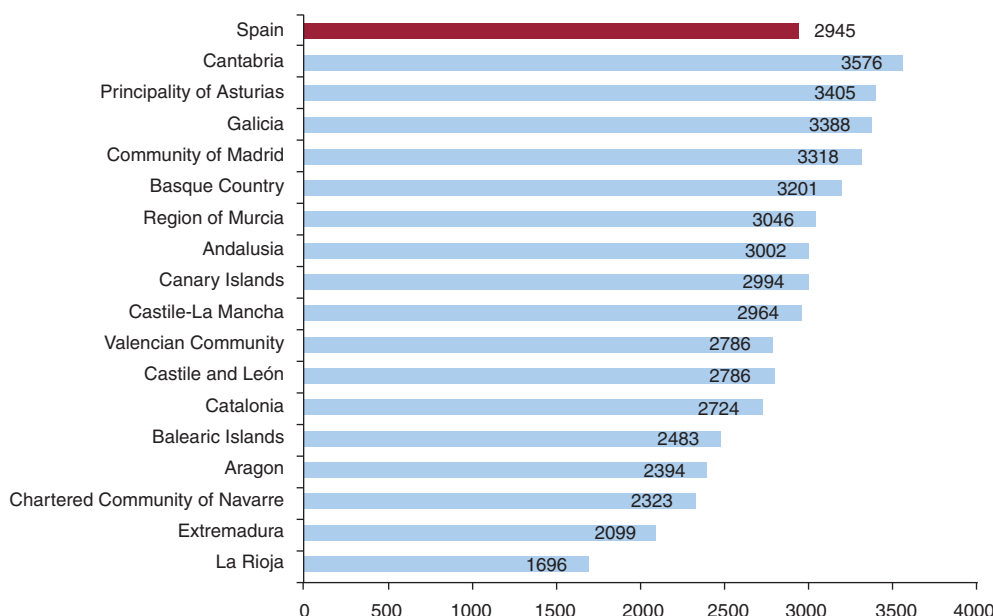


Figure 4. Distribution of coronary angiograms per million population and region.

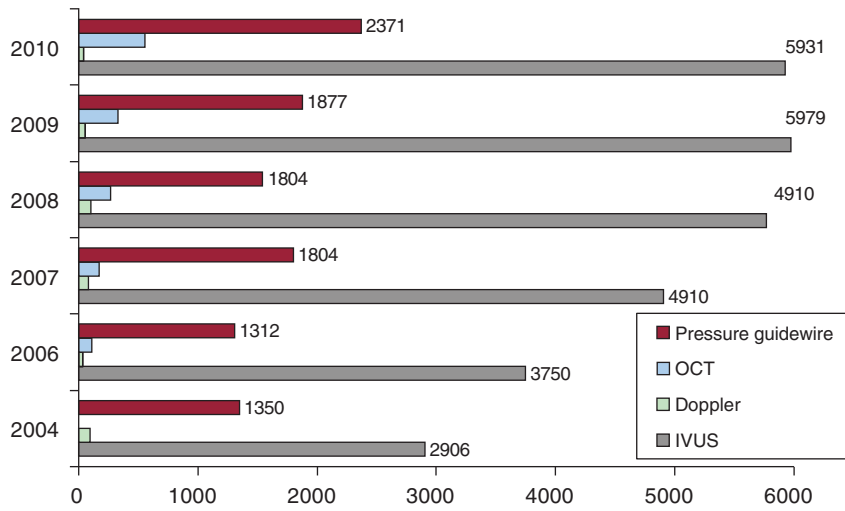


Figure 5. Evolution of intracoronary diagnostic techniques. IVUS, intravascular ultrasound; OCT, optical coherence tomography.

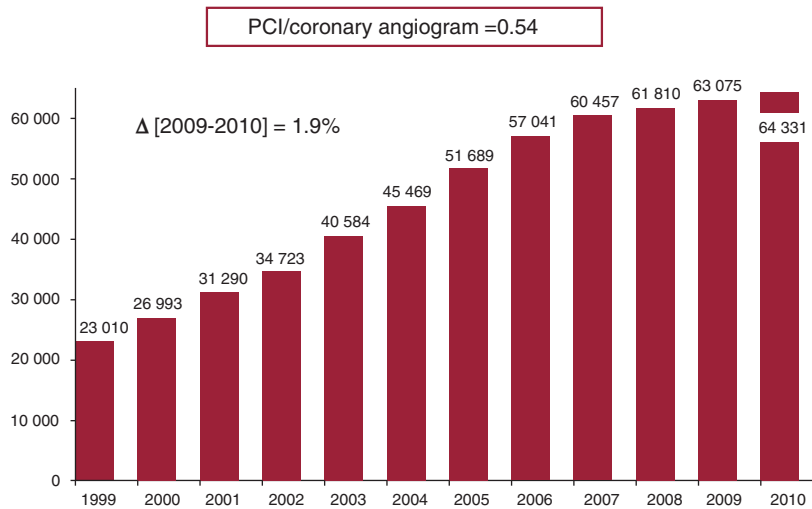


Figure 6. Evolution of the number of percutaneous coronary interventions performed between 1999 and 2010. PCI, percutaneous coronary intervention.

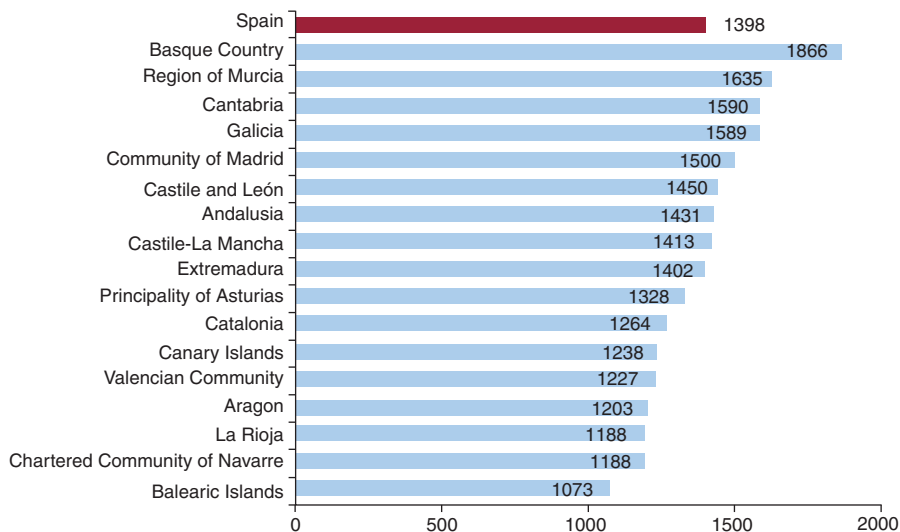


Figure 7. Distribution of percutaneous coronary interventions per million population and region.

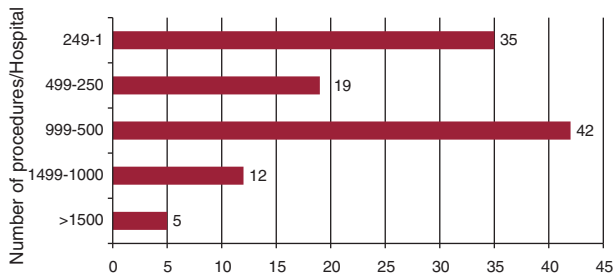


Figure 8. Distribution of hospitals according to the number of percutaneous coronary interventions performed in 2010.

was used in 37 064 cases, and for the first time underwent a decrease, of 9%. Collagen was used in 68% of these procedures, suture in 14.3%, and other types of device in 17.3%.

Stents

Stents were implanted in 96.5% of all PCIs (2% more than in 2009), with a total of 62 046 units used in 100 371 procedures in 2010 (3500 units less than in 2009). Again, the ratio of stents per patient decreased to 1.6 (1.6 in 2009); this could be related to the increase in angioplasty in myocardial infarction, where the ratio of stents per procedure is usually lower than in elective

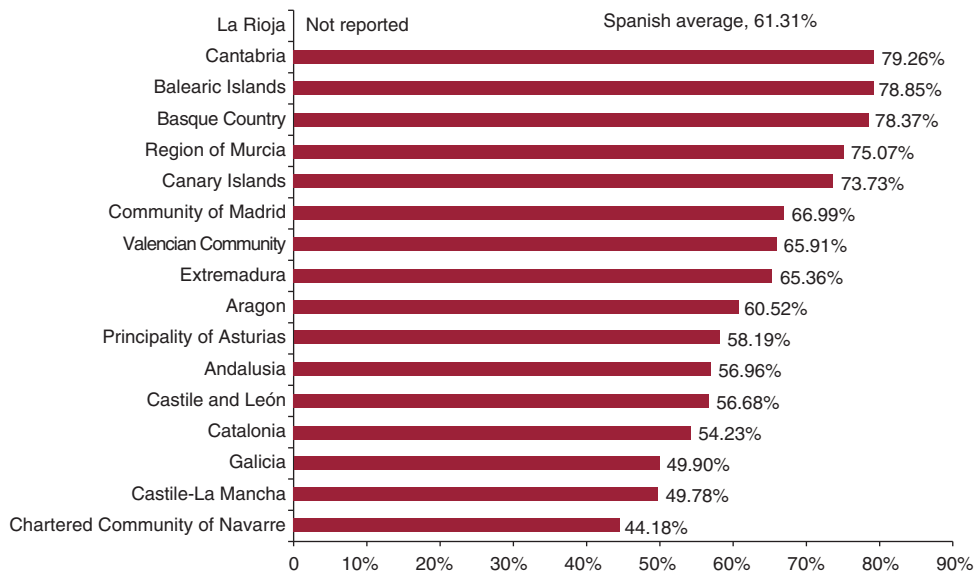


Figure 9. Distribution of antiproliferative drug-eluting stents as a percentage of all stents implanted by region.

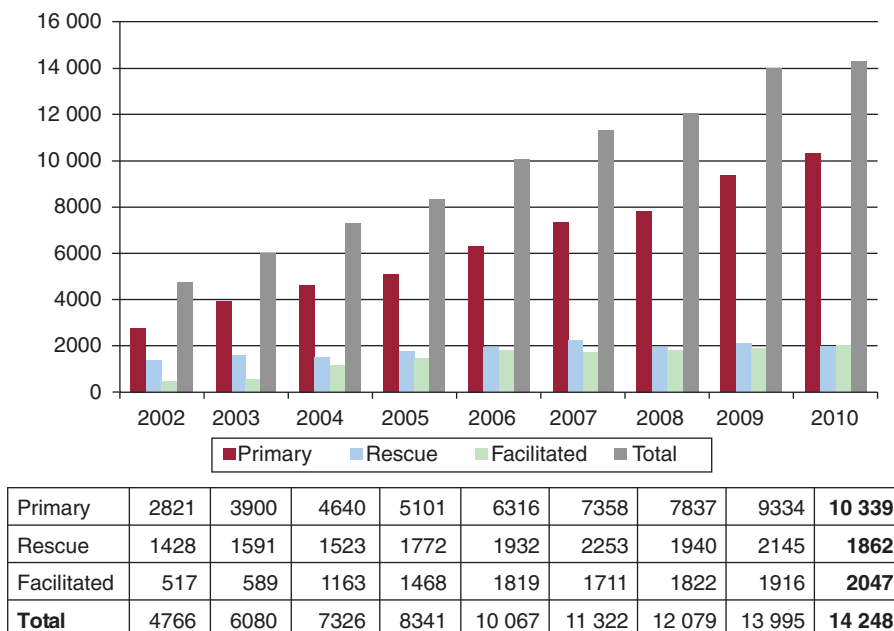


Figure 10. Evolution of the types of percutaneous coronary intervention in acute myocardial infarction.

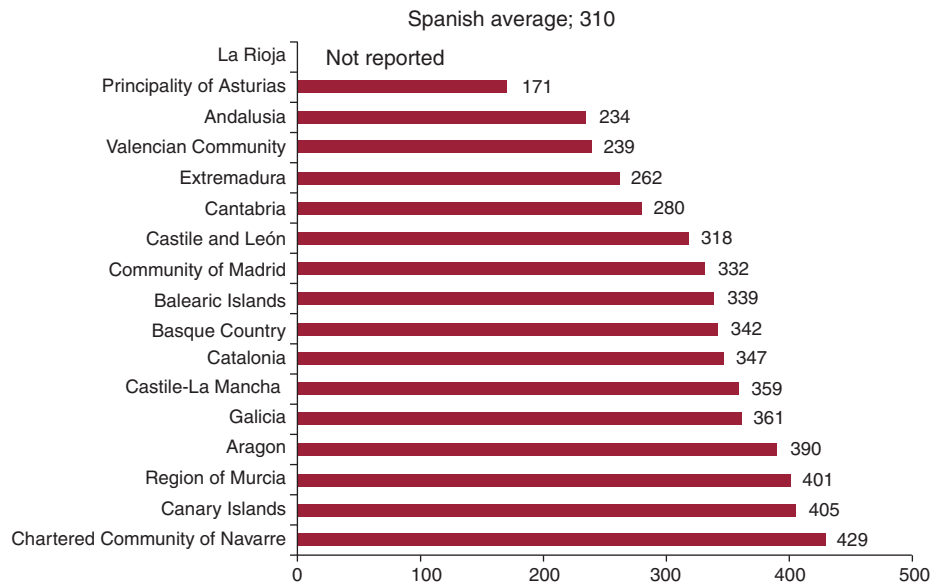


Figure 11. Distribution of percutaneous interventions in acute myocardial infarction per million population and region.

surgery. The use of DES increased by 1.8% compared to 2009 and stood at 61.3%, representing 61 535 units. Since the characteristics of the patients and target lesions varied considerably, either one or both types of stent were used. Specifically, the percentage of procedures in which DES alone were used was 37.3%, which was a similar number to that of 2009 (33.6%) but almost 20% less than in 2008.

The use of DES continued to vary substantially between the Spanish regions, ranging from 79.3% in Cantabria to 44.2% in the Chartered Community of Navarre (Fig. 9).

Other Devices and Percutaneous Coronary Intervention Procedures

The use of rotational atherectomy continued to grow (14.11%) compared to 2009, standing at 1213 procedures. The use of directional atherectomy or intracoronary brachytherapy was not

reported. Among other devices, the use of cutting balloons continued to grow, with 2092 procedures in 2010. This was 17% more than in 2009 and 50% more than in 2008, reflecting an increase in the complexity of the cases. This is also indicated by the increased use of rotational atherectomy. Thrombectomy catheters were used in 7032 cases in 2010 compared to the 5481 in 2009, similar to the increase in infarct PCIs.

Intervention in Acute Myocardial Infarction

The 14 248 PCIs performed in acute myocardial infarction (AMI) represent a 6% increase compared to 2009, which was 10% higher than 2008, and constituted 22% of all PCIs (Fig. 10). Of the total number of procedures, 22.3% were performed in women (5% more than in 2009) and 23.6% in patients aged more than 75 years, which was 2% more than last year.



Figure 12. Distribution of primary angioplasties per million population and region.

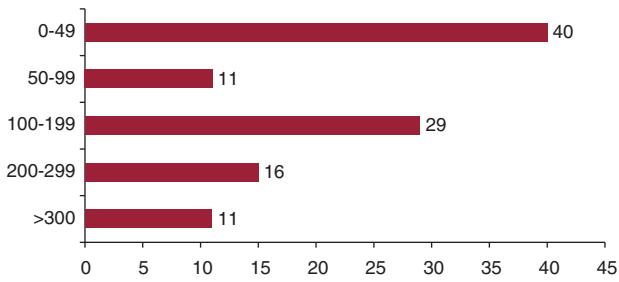


Figure 13. Distribution of hospitals according to the number of percutaneous coronary interventions in acute myocardial infarction.

Within the range of PCI procedures performed in the acute phase of AMI, primary angioplasty continued to increase and was the fastest growing approach, increasing from 9334 in 2009 to 10 339 in 2010 (a 10% increase compared to 2009 and a 29% increase compared to 2008). Four regions experienced marked growth in this regard: Principality of Asturias, Castilla-La Mancha, Catalonia, and Region of Murcia. Primary PCI accounted for 16% of angioplasties and 72.7% of all infarct PCIs; 2047 (14.4%) were facilitated PCI and 1862 (13%) were rescue PCIs, which decreased by 300 procedures

compared to 2009 (Fig. 10). There are no national data available on the number of ST-segment elevation AMI, but given the annual estimate for Spain of 45 000 AMI,^{24,25} then primary PCI would be used in just 20% of cases, despite the target of the Stent 4 Life initiative of 70% of primary PCIs in AMI.²⁰

The national distribution of PCI in AMI shows a similar distribution to that of 2008, whereby those communities with an organized continuous care program for AMI had the best data (Figs. 11 and 12).

Regarding the number of procedures per center, 27 performed more than 200 infarct PCIs per year (4 more than in 2009), whereas 40 performed fewer than 50 (5 less than the previous year; see Figure 13).

Noncoronary Interventions in Adults

Mitral valve replacement remained the most frequent non-coronary intervention (324 cases), despite the slow but steady yearly decrease (Fig. 14). The technique was performed in 59 of the 113 hospitals. Aortic valve replacement doubled in 2 years, increasing from 75 in 2008 to 146 in 2010. The growth in TAVI remained spectacular, increasing from 426 in 2009 to 655 in 2010

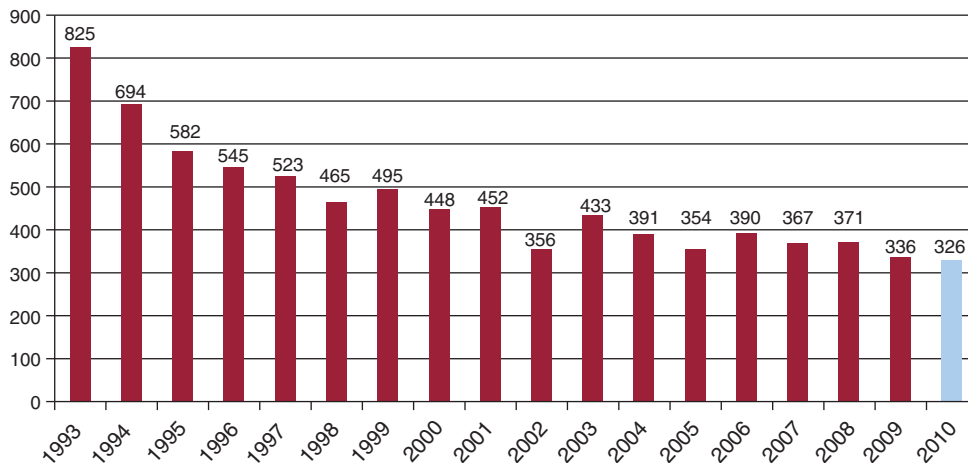


Figure 14. Evolution of mitral valve replacements in Spain.

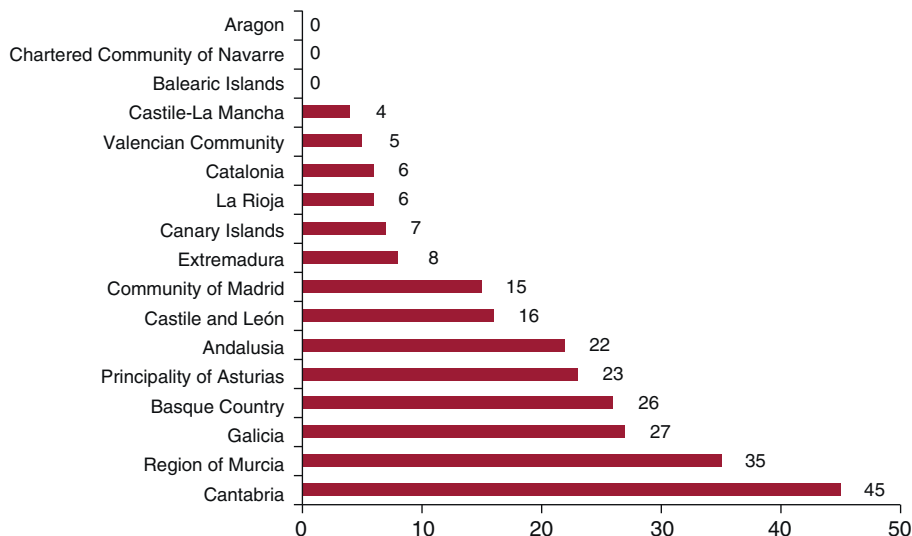


Figure 15. Distribution of percutaneous aortic valve implantation by region (units per million population).

(39 hospitals performed the technique). Of these, 51% of the devices were self-expanding (94.4% successful; hospital mortality 5.6%) and 49% were balloon-expandable devices (92.1% successful; hospital mortality 7.9%). Figure 15 shows the distribution by region.

The treatment of adult congenital heart disease remained the most common noncoronary intervention procedure. In total, 682 procedures were performed (compared to 731 in 2009) and the most common of these was atrial septal defect (ASD) closure, with a total of 295 cases (329 in 2009) and a 96% success rate. There were major complications in 1.6% of cases and another 1.6% were classified as failures without complications. Foramen ovale closure was performed in 265 cases (232 in 2009) with a 99% success rate and only 1 major complication. Aortic coarctation was performed in 47 cases (10 more than last year). Other procedures included the closure of ductus, ventricular septal defects, and fistula.

In total, 114 paravalvular leaks were treated, 20 more than in 2008, of which 27 were mitral and 87 aortic.

Interventions in Pediatric Patients

In total, 10 hospitals provided data on their activity in pediatric patients (16 years old or younger). These included 60 ASD closures and 93 ductus closures as the most common procedures.

CONCLUSIONS

The 2010 registry shows that the plateau or slight decrease in the development of diagnostic and therapeutic procedures has not changed. Angioplasty in the setting of AMI continues to grow, particularly that of primary PCI, probably due to the incorporation of new regions into primary PCI programs and the marked increase

in the number of primary PCI performed in some hospitals. The Stent 4 Life program, which is a priority for the European Society of Cardiology, the Spanish Society of Cardiology, and our own working group, should serve to improve myocardial infarction care in Spain by raising awareness among policy makers, management, and medical professionals.

In general, differences remain between Spanish regions in the use of PCI, and specifically in its use for myocardial infarction.

The use of DES has remained stable in recent years, with considerable variation between regions and a distribution similar to that of previous years. The use of rotational atherectomy and cutting balloons increased considerably—possibly due to the cases becoming more complex—as well as the use of thrombectomy catheters due to increased infarct PCIs.

Radial access was used in more than 50% of cases for diagnosis and approached the same percentage in procedures.

Special reference should be made to TAVI, which grew by 50% compared to 2009. Despite its elevated cost, its spectacular growth remains unabated given that 39 hospitals performed TAVI procedures.

ACKNOWLEDGEMENTS

The Board of the Working Group on Cardiac Catheterization and Interventional Cardiology would like to thank the directors and staff of Spain's catheterization laboratories, as well as those responsible for data collection, for all their work which made this registry possible.

CONFLICTS OF INTEREST

None declared.

APPENDIX 1

Hospitals Participating in the 2010 Registry

Public hospitals	Private hospitals
Andalusia	
Complejo Hospitalario Torrecárdenas	Clínica El Ángel
Complejo Hospitalario Universitario de Jaén	Clínica Nuestra Señora de la Salud, Cádiz
Complejo Universitario Carlos Haya	Clínica Parque San Antonio
Hospital Clínico Universitario Virgen de la Victoria	Hospital USP de Marbella
Hospital Costa del Sol	Hospiten Estepona
Hospital de Jerez de la Frontera	
Hospital Juan Ramón Jiménez	
Hospital Universitario de Valme	
Hospital Universitario Puerta del Mar	
Hospital Universitario Puerto Real (Cádiz)	
Hospital Universitario Reina Sofía	
Hospital Universitario Virgen de las Nieves	
Hospital Universitario Virgen del Rocío	
Hospital Universitario Virgen Macarena	
Aragon	
Hospital Clínico Universitario Lozano Blesa, Zaragoza	
Hospital Universitario Miguel Servet, Zaragoza	
Principality of Asturias	
Hospital Central de Asturias	Centro Médico de Asturias
Cantabria	

APPENDIX 1Hospitals Participating in the 2010 Registry (*continued*)

Public hospitals	Private hospitals
Hospital Universitario Marqués de Valdecilla	
Castile and León	
Hospital Clínico Universitario de Salamanca	Hospital Campo Grande (CEMIN)
Hospital Clínico Universitario de Valladolid	
Hospital de León	
Hospital General Yagüe	
Castile-La Mancha	
Hospital General de Ciudad Real	
Hospital General Universitario de Albacete	
Hospital General Universitario de Guadalajara	
Hospital Virgen de la Salud	
Catalonia	
Ciutat Sanitària i Universitària de Bellvitge	Centre Cardiovascular Sant Jordi
Hospital Clínic i Provincial de Barcelona	Hospital de Barcelona SCIAS
Hospital de la Santa Creu i Sant Pau	Hospital General de Catalunya
Hospital del Mar, Barcelona	Hospital Universitari Sagrat Cor (ANGIOCOR, S.L.)
Hospital General Universitari Vall d'Hebron	Hospital Universitari Mútua de Terrassa
Hospital Universitari Dr. Josep Trueta	
Hospital Universitari Germans Trias i Pujol	
Hospital Universitari Joan XXIII	
Hospital Universitario Arnau de Vilanova de Lleida	
Valencian Community	
Hospital Clínico Universitario de Valencia	Clínica Medimar Alicante
Hospital de la Ribera (Alzira)	Hospital 9 de Octubre de Valencia
Hospital General de Alicante	Hospital Clínica Benidorm
Hospital General de Castellón	Hospital del Vinalopó
Hospital General Universitario de Elche	Hospital Levante Benidorm
Hospital General Universitario de Valencia	Hospital Perpetuo Socorro, Alicante
Hospital Universitario Dr. Peset	Hospital San Jaime Torreveja USP
Hospital Universitario La Fe	UTE Torreveja Salud
Hospital Universitario San Juan de Alicante	
Extremadura	
Hospital de Cáceres	
Hospital Universitario Infanta Cristina	
Galicia	
Complejo Hospitalario Universitario de A Coruña	Instituto Médico Quirúrgico San Rafael
Complejo Hospitalario Universitario de Santiago	
Complejo Hospitalario Universitario de Vigo	
Balearic Islands	
Hospital Universitario Son Dureta	Clínica Juaneda
	Clínica Rotger
	Clínica USP Palmaplanas
	Policlínica Miramar
Canary Islands	
Hospital de Gran Canaria Dr. Negrín	
Hospital Universitario de Canarias, Tenerife	
Hospital Universitario Insular de Gran Canaria	
Hospital Universitario Ntra. Sra. de Candelaria	
Hospiten Rambla	
Community of Madrid	
Hospital Central de la Defensa Gómez Ulla	Clínica La Luz
Hospital Clínico San Carlos	Clínica Moncloa, Madrid
Hospital General Universitario Gregorio Marañón	Clínica Nuestra Señora de América

APPENDIX 1

Hospitals Participating in the 2010 Registry (*continued*)

Public hospitals	Private hospitals
Hospital Puerta de Hierro	Clínica Ruber
Hospital Ramón y Cajal	Fundación Jiménez Díaz
Hospital Universitario 12 de Octubre	Hospital La Moraleja (Sanitas)
Hospital Universitario de La Princesa	Hospital La Zarzuela
Hospital Universitario Fundación Alcorcón	Hospital Universitario Quirón Madrid
Hospital Universitario La Paz	Hospitales de Madrid Montepríncipe y Sanchinarro
	Sanatorio del Rosario de Madrid
	Sanatorio La Milagrosa
	Sanatorio San Francisco de Asís
Region of Murcia	
Hospital Universitario Santa María del Rosell	Hospital San Carlos, Murcia
Hospital Universitario Virgen de la Arrixaca	Hospital Virgen de la Vega, Murcia
Chartered Community of Navarre	
Hospital de Navarra	
Basque Country	
Hospital de Basurto - Basurtuko Ospitalea	Clínica Vicente San Sebastián
Hospital de Cruces	Policlínica Guipúzcoa
Hospital de Galdakao-Usansolo	
Hospital Txagorritxu	
La Rioja	
Hospital Viamed-Los Manzanos	

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