

Soraya Merchán,<sup>a,\*</sup> Javier Martín-Moreiras,<sup>a</sup> Aitor Uribarri,<sup>a</sup>  
Javier López,<sup>b</sup> Leyre Reta,<sup>b</sup> and Pedro L. Sánchez<sup>a</sup>

<sup>a</sup>Servicio de Cardiología, Hospital Universitario de Salamanca,  
Instituto de Investigación Biomédica de Salamanca (IBSAL),  
Salamanca, Spain

<sup>b</sup>Servicio de Cirugía Cardíaca, Hospital Universitario de Salamanca,  
Instituto de Investigación Biomédica de Salamanca (IBSAL),  
Salamanca, Spain

\* Corresponding author:

E-mail address: [arayamergo@gmail.com](mailto:arayamergo@gmail.com) (S. Merchán).

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## REFERENCES

1. Ariza-Solé A, Sánchez-Salado JC, Lorente-Tordera V, González-Costello J, Miralles-Cassina A, Cequier-Fillat A. Asistencia ventricular con membrana de

- oxigenación extracorpórea: una nueva alternativa al rescate del shock cardiogénico refractario. *Rev Esp Cardiol.* 2013;66:501-3.
2. Díez-Villanueva P, Sousa I, Núñez A, Díez F, Elízaga J, Fernández-Avilés F. Tratamiento precoz del shock cardiogénico refractario mediante implante percutáneo de ECMO venoarterial en el laboratorio de hemodinámica. *Rev Esp Cardiol.* 2014;67:1059-61.
3. Belohlavek J, Rohn V, Jansa P, Tosovsky J, Kunstyr J, Semrad M, et al. Venous-arterial ECMO in severe acute right ventricular failure with pulmonary obstructive hemodynamic pattern. *J Invasive Cardiol.* 2010;22:365-9.
4. Jones HA, Kalisetti DR, Gaba M, McCormick DJ, Goldberg S. Left ventricular assist for high-risk percutaneous coronary intervention. *J Invasive Cardiol.* 2012;24:544-50.
5. Fux T, Svenarud P, Grinnemo KH, Albåge A, Bredin F, Van der Linden J, et al. Extracorporeal membrane oxygenation as a rescue of intractable ventricular fibrillation and bridge to heart transplantation. *Eur J Heart Fail.* 2010;12:301-4.
6. Dalmau MJ, Beiras-Fernández A, Keller H, Bingold T, Moritz A, Stock U. Experiencia inicial de un programa de transporte interhospitalario con ECMO para pacientes con insuficiencia cardíaca aguda y/o insuficiencia respiratoria grave. *Rev Esp Cardiol.* 2014;67:329-30.

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## Use of Antihypertensive Drugs in Spain: National Trends From 2000 to 2012<sup>\*</sup>



### Uso de medicamentos antihipertensivos en España: tendencias nacionales en el periodo 2000-2012

#### To the Editor,

Hypertension is a major global public health problem, mainly because of its contribution to the risk of cardiovascular events.<sup>1,2</sup> Epidemiological studies<sup>2,3</sup> have reported that hypertension control in Spain continues to be suboptimal and that, on occasions, targets (arterial blood pressure < 140/90 mmHg) are met in less than half of the hypertensive individuals under treatment.<sup>2</sup> A number of previous studies<sup>4</sup> have called attention to important changes in the patterns of use of antihypertensive drugs in recent decades.

Following the methodology described by the Observatory for the Use of Medicines of the Spanish Agency of Medicine and Medical Devices,<sup>5</sup> we examined the pattern of antihypertensive drug use in Spain from 2000 to 2012. We selected the treatment subgroups of the Anatomical Therapeutic Chemical Classification (ATC): antihypertensive agents (C02), diuretics (C03), beta-blockers (C07), calcium channel blockers (C08), and drugs that act on the renin-angiotensin system (C09), such as angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and direct renin inhibitors (aliskiren). The analytical measure was the number of defined daily doses (DDD) dispensed per 1000 inhabitants per day (DID).<sup>5</sup> We used the consumption data provided by the Directorate-General of the Basic Service Portfolio of the Spanish Health and Pharmacy System, whose database compiles prescriptions for the medications covered by the Spanish Health System.

The patterns of use of antihypertensive drugs in Spain are shown in the Table (according to treatment subgroup and active ingredient). The use of antihypertensive medications in Spain increased from 2000 to 2012, and those most widely consumed were angiotensin receptor blockers and angiotensin-converting enzyme inhibitors. More specifically, the total used of antihyper-

tensive drugs was 165.5 DID in the year 2000 and 299.0 DID in 2012. By group, angiotensin receptor blockers (18.2 DID and 93.8 DID in 2000 and 2012, respectively), angiotensin-converting enzyme inhibitors (62.2 DID and 86.4 DID, respectively), diuretics (32.8 DID and 44.8 DID, respectively), and calcium channel blockers (33.4 DID and 38.8 DID) were the most widely used antihypertensive drugs. Enalapril (42.7 DID), amlodipine (20.7 DID), furosemide (16.4 DID), ramipril (15.1 DID), valsartan (14.3 DID), and candesartan (12.5 DID) were the most widely used active ingredients in 2012.

The upward trends in use had been observed in an earlier study performed in Spain for the period from 1995 to 2001.<sup>5</sup> In the present report, the series was extended to cover 2000 to 2012, revealing continued growth, with an increase of 80.7%. This continued growth occurred even though there have been no important changes in the marketing of new antihypertensive medications with respect to the existing groups. It is important to mention the introduction of aliskiren in 2008, of imidapril in 2004, of olmesartan in 2004, and of eplerenone in 2005. The consumption of antihypertensive drugs has increased all over Europe,<sup>6</sup> and the growth in Spain is similar to the European average. Germany in central Europe, Finland among the Nordic countries, and Italy in the Mediterranean area were the countries with the widest use in absolute terms. The consumption of antihypertensive drugs in Spain is higher than in other countries such as France and Portugal, and lower than in the United Kingdom and the central European and Nordic countries, with the exception of Luxemburg and Iceland.<sup>6</sup>

Whether the increase in the intensity of antihypertensive therapy in Spain has contributed to improving blood pressure control is, at best, controversial. Although the results of the various studies may appear to disagree, the evidence suggests that, despite the increase in the consumption of antihypertensive drugs, blood pressure control in Spain continues to be inadequate. The growth observed could be related to the increase in the prevalence of treated hypertension and population aging.<sup>1,2</sup> One of the limitations of this study is that it does not enable us to determine whether the reason for the increment in medication use is the increase in the number of hypertensive patients being treated (including mild forms), the increase in the duration of the treatments, or both. In addition, estimation of drug use was based on the DDD, which is a unit of measure that does not necessarily coincide with the dose actually used in clinical practice. Moreover, true consumption of these drugs could be higher than that

<sup>\*</sup> The opinions expressed in this report are the responsibility of the authors and, thus, do not necessarily reflect the point of view of the organisms in which they work.

**Table**  
Use of Antihypertensive Drugs in Spain According to Treatment Subgroup and Active Ingredient. Data Expressed as Defined Daily Doses per 1000 Inhabitants per Day

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Antihypertensive drugs (C02)</b>													
Clonidine	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Doxazosin	4.27	5.15	6.08	7.10	7.74	7.98	8.19	8.42	8.54	8.87	8.88	8.64	9.05
Hydralazine	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.08	0.08	0.08
Methyldopa (racemic)	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Minoxidil	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01
Moxonidine	0.22	0.25	0.25	0.29	0.32	0.33	0.35	0.38	0.40	0.43	0.42	0.39	0.38
Prazosin	0.07	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01
Rauwolfia serpentina alkaloids <sup>a</sup>	0.07	0.05	0.04	0.02	0.01	0.01	< 0.01						
Reserpine and diuretics <sup>b</sup>	0.07	0.06	0.03	0.03	0.02	< 0.01							
Reserpine and diuretics, combinations with others <sup>b</sup>	0.14	0.12	0.10	0.08	0.07	0.05							
<b>Total C02</b>	<b>4.95</b>	<b>5.77</b>	<b>6.65</b>	<b>7.66</b>	<b>8.30</b>	<b>8.50</b>	<b>8.67</b>	<b>8.92</b>	<b>9.06</b>	<b>9.43</b>	<b>9.43</b>	<b>9.16</b>	<b>9.56</b>
<b>Diuretics (C03)</b>													
Bumetanide	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Chlorthalidone	5.17	5.12	5.01	5.02	5.21	5.20	5.23	5.19	5.11	5.10	4.89	4.61	4.82
Chlorthalidone/spironolactone	0.15	0.14	0.11	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08
Eplerenone						< 0.01	0.03	0.08	0.23	0.31	0.36	0.48	0.62
Spironolactone	2.02	2.12	2.16	2.23	2.11	2.20	2.17	2.14	2.12	2.17	2.15	2.14	2.20
Furosemide	7.75	8.13	8.43	8.24	9.21	9.77	10.66	11.50	12.28	13.30	14.08	14.86	16.42
Furosemide-xanthinol/triamterene	1.24	1.15	1.03	0.94	0.85	0.74	0.67	0.60	0.54	0.51	0.46	0.42	0.38
Hydrochlorothiazide	4.22	4.73	5.23	5.80	6.56	7.12	7.81	8.38	8.90	9.25	9.46	9.42	9.40
Hydrochlorothiazide/potassium sparing diuretics	3.97	3.83	3.63	3.49	3.34	3.16	3.01	2.84	2.63	2.53	2.33	2.16	2.06
Indapamide	4.65	4.75	4.80	5.03	5.10	4.95	4.89	4.71	4.52	4.43	4.12	3.79	3.77
Piretanide	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	< 0.01
Torsemide	2.47	3.07	3.72	4.34	4.72	4.82	4.93	4.93	4.97	5.16	5.05	4.79	4.72
Xipamide	0.74	0.66	0.59	0.53	0.47	0.41	0.37	0.33	0.30	0.28	0.25	0.22	0.20
Spironolactone/altizide	0.36	0.36	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.24	0.23	0.13	0.13
Mebutizide/ potassium sparing diuretics <sup>c</sup>	0.03												
Spironolactone/bendroflumethiazide <sup>d</sup>	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
<b>Total C03</b>	<b>32.82</b>	<b>34.12</b>	<b>35.11</b>	<b>36.09</b>	<b>38.01</b>	<b>38.79</b>	<b>40.16</b>	<b>41.08</b>	<b>41.96</b>	<b>43.39</b>	<b>43.50</b>	<b>43.14</b>	<b>44.84</b>
<b>Beta blockers (C07)</b>													
Acebutolol <sup>a</sup>	0.06	0.05	0.04	< 0.01	< 0.01	< 0.01	< 0.01						
Acebutolol/thiazide <sup>a</sup>	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01						
Atenolol	6.38	6.64	6.78	6.84	7.38	7.33	7.64	7.65	7.48	7.51	7.32	7.10	7.22
Atenolol/bendroflumethiazide	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Atenolol/chlorthalidone	1.16	1.13	1.04	0.53	1.07	1.03	1.01	0.97	0.91	0.87	0.84	0.78	0.76
Atenolol/hydrochlorothiazide/amiloride	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Atenolol/hydralazine/bendroflumethiazide <sup>e</sup>	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01
Bisoprolol	2.14	2.46	2.78	3.06	3.38	3.63	3.97	4.31	4.63	5.17	5.61	6.05	6.92
Bisoprolol/hydrochlorothiazide	0.39	0.46	0.51	0.57	0.64	0.67	0.70	0.71	0.71	0.75	0.73	0.70	0.71
Carteolol <sup>f</sup>	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carvedilol	1.11	1.30	1.53	1.78	2.04	2.28	2.52	2.69	2.83	3.04	3.11	3.13	3.38
Celiprolol	0.09	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03
Labetalol	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Metoprolol	0.34	0.36	0.38	0.39	0.40	0.39	0.40	0.40	0.40	0.42	0.42	0.42	0.45
Metoprolol/felodipine	0.52	0.55	0.52	0.48	0.48	0.48	0.47	0.46	0.45	0.45	0.41	0.37	0.36
Metoprolol/thiazide <sup>b</sup>	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01							
Nadolol	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.05	0.04	0.06	0.07	0.08
Nebivolol	0.43	0.75	1.00	1.20	1.29	1.32	1.46	1.70	2.03	2.52	2.70	2.71	2.83
Oxprenolol	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Oxprenolol/chlorthalidone	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.01	0.01

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