

## Antimicrobial stewardship in Spain: Programs for Optimizing the use of Antibiotics (PROA) in Spanish hospitals

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Antimicrobial stewardship (AMS) activities are intended for the optimization of antimicrobial use in the clinical setting. This optimization aims a better outcome of patients (which is the main objective), a reduction or containment of antimicrobial resistance and a cost-effective management of infections.<sup>1</sup>

In this way, in the last years in Spain as in other countries, there had been several local

initiatives for antimicrobial stewardship with interesting results.<sup>2-12</sup> In 2012 the Spanish Society for Infectious Diseases and Clinical Microbiology (SEIMC), together with the Spanish Preventive Medicine, Public Health and Hygiene Society (SEMPSPH) and the Spanish Hospital Pharmacy Society (SEFH) published a consensus document about AMS and named it as Programs for Optimizing the use of Antibiotics (PROA).<sup>13</sup> This was a review of the evidence so far on how to develop AMS activities, especially in hospitals. In 2014, the Spanish Ministry of Health, by means of the Spanish Agency of Medicines and Health Products (AEMPS) launched the National Action Plan against Antimicrobial Resistance (PRAN) which included several action areas, PROA being one of the pillars of the Plan.<sup>14</sup> In addition, after an invitation from the Spanish Minister of Health, in 2016 a delegation from the ECDC traveled to Spain with the aim of evaluating the situation of antimicrobial resistance, encouraging the prudent use of antibiotics and infection control.<sup>15</sup> This visit was followed by a report that highlighted several problems found, mainly the extent of bacterial resistance, and a high antimicrobial consumption observed in the country. Likewise, the presence of isolated surveillance programs in several areas of Spain was detailed, being considered as interesting, however, in many cases, they lacked the corresponding feedback to achieve specific objectives. Finally, the complexity of the management of these aspects in Spain was exposed, since health management is transferred to 17 different Autonomous Regions. However, these regional experiences helped the PRAN<sup>14</sup> to consolidate different ongoing strategies such as designing and disseminating tools for promoting good practices for the use of antibiotics. The PROA was the keystone for developing this action, and the

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SEIMC-SEMPSPH-SEFH PROA consensus document<sup>13</sup> was further developed and adopted by more than 10 scientific societies (SEIMC, SEMPSPH, SEFH, SEFAP, SEFC, SEMICYUC, SEMERGEN, SENFYC, SEMG, SEFAP, SEPEAP, AEPap, PAP en Red), the 17 Autonomous Regions, and the Ministry of Health. This adopted document was the basis for designing the national PROA program.<sup>16</sup> It is noteworthy that some Autonomous Regions of Spain had previously developed antimicrobial use surveillance and intervention programs, with successful examples as the PIRASOA program in Andalusia,<sup>17,18</sup> and the VINCAT program in Catalonia.<sup>19,20</sup> These were quite helpful for the National Plan as well as for other regions. To date, since the adoption of the National Strategy, most of the Autonomous Regions (16 out of 17) have implemented strategies at regional level and those with already existing programs have consolidated or expanded them. A great majority of hospitals in Spain and, in some regions, also primary care centers, have started the development of their own PROA programs.

Despite the fact that Spain continues to be among the countries with the highest antibiotic consumption in Europe, all these efforts lead to a drop in consumption of 4.78% between 2016 and 2017, with Autonomous Regions having reductions up to 10%, which constitutes a very significant progress.

The Spanish PROA model is developed under a previous important requirement, which is that the national and regional healthcare managers, and each healthcare center as an institution, recognize the need of PROA programs and collaborate in their implementation. In this sense, in Spain there have been some recent normatives from central, regional and local authorities promoting good practices in antimicrobial use. And in fact, in some regions some PROA indicators have been included among the objectives of the hospitals within their management contracts. PROA is therefore an institutional initiative emanated from the Infection Committees of each center with the support of the centers' directors. Thus, it is recommended that the local PROA is

formally endorsed by one of the lead managers of the center, such as the chief medical officer. The main general objective of PROA is to improve clinical outcome of patients with infectious diseases through the appropriate use of antimicrobials. The PROA also looks for a reduction or containment of antimicrobial resistance and other adverse events, and costs. The operational objective is to optimize the indication, choice, dosage, route and duration of antibiotic therapy. The portfolio of services includes monitoring of antimicrobial use and costs, prescription quality, indicators of process and clinical results and resistances, development and actualization of antimicrobial therapy guidelines, performing audits and consultations, promoting education in antimicrobial use, and establishing good communication channels. The executive part of the program is developed by the PROA team. It is a multidisciplinary group of professionals from the center, mainly Infectious Diseases Physician (which is the coordinator usually), Pharmacist with expertise in antimicrobial therapy, Clinical Microbiologist with expertise in antimicrobial resistance, Intensive Care Physician in centers with Intensive Care Unit, and other professionals depending on the center complexity and idiosyncrasy. The team has to achieve a basic level of organization, institutionalization, technical and human resources, objectives, surveillance system, indicators with feedback, audits/consultations education and communication. One important tool for the development of PROA is the information technology tools. For a more efficient organization and accomplishment of objectives it is important to have rapid access to updated surveillance data (antimicrobial consumption, costs, antimicrobial resistance rates, process and clinical indicators, etc.). For this, the National Action Plan is developing a computer tool aimed to facilitate these activities to local centers, and at the same time to centralize data of activity and results.

Education is an important issue for PROA development. For this, in 2017 the SEIMC and the SEFH organized a national University-accredited on-line course with the Spanish

National Distance Education University (UNED) with very good acceptance and results. Previously, SEIMC had included two PROA courses (basic and advanced) in its online educational portfolio (Campus SEIMC). Other national courses have been developed as the PROA Implementation Course of Barcelona University. The SEIMC and SEFH have also developed a certification system for centers willing to certify their PROA at one of three levels of accomplishment: basic, advanced or excellent. This certification system has been adopted by the National Action Plan and it is in the process of being officially implemented in the Autonomous Regions. Additionally, the Spanish Society of Intensive Medicine and Coronary Units (SEMICYUC), in collaboration with the SEFH, is developing an antimicrobial training course in critical patients. which includes education in PROA.

Primary care centers are also developing PROA in Spain. In Andalusia, the PIRASOA program integrates PROA in hospital settings and in primary care since 2014.<sup>17</sup> Primary care is the healthcare area where more antibiotics are used. How it is being developed in Spain is another interesting issue that could be explained in a near future.

The road has only just begun at national level. Now it is time to consolidate these programs and to analyze their development and results. Patients deserve the more optimized antimicrobial therapy with the less ecological pressure in order to get the best clinical results while minimizing the selection and dissemination of antimicrobial resistance.

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