Opinion and debate

Nuclear medicine in Spain: High technology 2013


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ABSTRACT

This article details the high technology equipment in Spain obtained through a survey sent to the three main provider companies of equipment installed in Spain. The geographical distribution of High Technology by Autonomous Communities and its antiquity has been analyzed.

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Medicina nuclear en España: alta tecnología 2013

RESUMEN

En este artículo se aportan los datos del equipamiento de alta tecnología en España obtenidos a través de una encuesta enviada a las tres principales compañías que son proveedoras de equipamiento en España. En la misma se analizan la distribución geográfica de la Alta Tecnología por Comunidades Autónomas así como su antigüedad.

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Databases of the high technology (HT) available in Nuclear Medicine in Spain [positron emission tomography (PET) and gamma cameras (single photon emission computed tomography (SPECT))] are little known or are questionable. Indeed, there has been no publication on this matter since 2001.1 On the other hand, these data are of great interest to nuclear physicians and the administration. Therefore, the Executive Committee of the Spanish Society of Nuclear Medicine and Molecular Imaging (SEMNIM) decided to determine the current situation of the PET and SPECT equipment in our country with the main objectives of knowing the national distribution and how long the HT had been in service. Since GE, Siemens and Philips are the main companies producing, commercializing and distributing gamma cameras and PET scanners in Spain, they were asked to collaborate by filling in an Excel sheet with very specific, freely interpreted data, maintaining the confidentiality of the data provided. We are grateful to these three companies for their collaboration.

This article presents the data obtained, by Autonomous Community (AC), of the equipment in place as of December 31, 2013. On the other hand, a survey sent to the Presidents of the Autonomous Societies and Departments of Nuclear Medicine is currently pending receipt and analysis. This survey will provide global data related to the personnel, teaching, radiotracers, number of rooms for metabolic therapy, total number of studies performed and per organ systems and the costs of radiotracers in 2011–2013 (the latter data provided by the radiotracer industry). Data related to department structure will also be analyzed.

Data related to radioguided surgery, PET-MR, PET breast scans, or other equipment used in Nuclear Medicine including dose calibrators, radiation detectors, radioactive markers, point sources, etc. were not included.

In relation to the questionable data mentioned at the beginning of this article we are basically referring to the data published at the web site of the Ministry of Health, Social Services and Equality (MSSSI) using the search item High Technology Equipment by AC.2 Data on equipment considered as HT are periodically published at this web site (Table 1). Nonetheless, these data are not particularly sound since there do not seem to be any general criteria for all the...
Table 1
High technology equipment available by autonomous community (current data of the ministry of health) and data of the SEMNIM (orange).

<table>
<thead>
<tr>
<th>Autonomous community</th>
<th>GAM</th>
<th>SPECT</th>
<th>PET</th>
<th>SPECT/SPECT-TAC</th>
<th>PET-PET-TAC</th>
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<td>33</td>
<td>11</td>
<td>2</td>
<td>44</td>
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<tr>
<td>Aragón</td>
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<td>4</td>
<td>1</td>
<td>7</td>
<td>3</td>
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<tr>
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<td>5</td>
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<td>7</td>
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<td>13</td>
<td>2</td>
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<tr>
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<td>3</td>
<td>1</td>
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<td>2</td>
<td>1</td>
<td>13</td>
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<td>2</td>
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<td>6</td>
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<tr>
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<td>52</td>
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<td>8</td>
<td>12</td>
<td>29</td>
<td>10</td>
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<td>5</td>
<td>1</td>
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<td>4</td>
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<td>National total</td>
<td>214</td>
<td>75</td>
<td>59</td>
<td>258</td>
<td>82</td>
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</tbody>
</table>

Modified from Ref. 2. Data of the equipment per autonomous community and national total. GAM, gamma camera; SPECT, single photon emission computed tomography; SPECT/SPECT-CT, gamma cameras, SPECT and SPECT-CT SEMNIM survey. PET, positron emission tomography; PET–PET-CT, PET and PET-CT SEMNIM survey. The gamma camera data in Catalonia include SPECT.

AC as can be seen in Table 1 and Figs. 1 and 2 in which the data provided in the column from the SEMNIM survey do not coincide with the data provided by the companies producing and commercializing the equipment considered as HT. In fact, according to the Ministry the gamma camera and SPECT park consist of 257 gamma cameras and 82 PET scanners. On the other hand, in the online publication of the MSSSI there are no uniform criteria. Gamma cameras are named, and SPECT equipment is included in this section in a column which does not differentiate whether they are SPECT or SPECT-CT scanners. The AC of Catalonia is a clear example in which SPECT scanners are included in the gamma camera column. Neither are the PET scanners differentiated as PET or PET-CT. One important defect of this publication is that it does not specify how long ago the HT base was installed and, of course, neither the needs nor the planning is mentioned, both of which are important data for us and should be demanded from all the ACs by the MSSSI.

At a world level we can find no official data showing the availability or the length of service of the HT by countries. It is also true that there are no regulations or international norms related to criteria of obsolescence and the need for replacement, both of which are fundamental aspects for provision planning. On reviewing the literature we found that there are only recommendations from the manufacturers about equipment depreciation and half life. This is clearly a very complex matter that requires an effort on behalf of all the parties involved: patients, nuclear physicians, management teams, as well as the industry and administration in order to define the criteria of obsolescence or “end-of-life” of the equipment, its replacement and the acquisition of new technology.

The first objective of the present article was to determine the distribution of HT in our country, and on analyzing the data provided we found evident disparities and, consequently, a lack of planning criteria in the introduction of HT in Nuclear Medicine in the ACs. The second objective was to assess the length of service of the equipment and the need for replacement in the Departments of Nuclear Medicine in Spain.

Table 1 and Figs. 1 and 2 clearly depict the disparity in the distribution of HT in Spain, reflecting an absence of planning on behalf of our health care system. It is true that the private sector

![SPECT and SPECT-CT equipment per million inhabitants in Spain by autonomous community.](image-url)
predominates in PET scanners in Spain thereby making it difficult for the government to control. However, we are obliged to inform the health care authorities of the need to control the introduction of and correct the disparities in HT where necessary so that the necessary equipment is installed to provide adequate, fair and egalitarian health care to our population in all the ACs, and thus, access to HT in Nuclear Medicine.

On analysis of the data obtained, the total number of PET scanners in Spain is 82 (9 PET and 72 PET-CT), with 1.74 per million inhabitants or 1 PET per 574,000 inhabitants. These data drift to the negative in the ACs of Castilla La Mancha (0.48 and 2,100,998), Castilla and León (0.80 and 1,259,938), Extremadura (0.91 and 1,104,004) and the Canary Islands (0.94 and 1,059,340) and to the positive in La Rioja (2.28 and 322,027), the Community of Madrid (2.77 and 360,864), the Community Foral of Navarra (3.10 and 322,239) and the Principality of Asturias (2.80 and 356,055). It is of note that the only AC with no PET in a public hospital is Aragon, although Castilla and León and the Principality of Asturias were in the same situation until this year.

In relation to the SPECT cameras, Spain has 5.47 per million inhabitants or 1 camera per 182,674 inhabitants, with a total of 258 (194 SPECT and 64 SPECT-CT). The worst results are found in the ACs of Region of Murcia, Castilla La Mancha and La Rioja (2.72/368,012, 2.86/350,166, 3.11/322,027 respectively). It is also interesting to note that there is no multi-modality equipment (SPECT-CT) in Cantabria or La Rioja.

The equipment service life is adequate with respect to the SPECT-CT (mean age of 4.4 years in Spain) and PET-CT (mean age of 4.74 years in Spain), and none of the equipments are older than 8 years. However, the non-multimodal PET, which is currently obsolete, and SPECT have a worrisome age of 8.6 and 10.25 years, respectively with regional means for the SPECT cameras of greater than 11 years in 6 ACs and in 4 ACs for the PET cameras. These data can be found at the web site of the SEMNIM.

The Executive Committee of the SEMNIM considers that the disparities among the ACs and the deficiencies in others are huge. Based on national and international publications we also foresee that in the next 5–10 years the need for PET-CT scanners will double due to the current new indications of the radiotracers and the development of new tracers which can be universally distributed and are more specific for different diseases. This has been demonstrated with the new radiotracers which have become available in the last 10 years including $^{18}$F-Dopa, $^{18}$F-Choline, $^{18}$F-tracers of amiloid plaque, etc. and the new possibility of using $^{68}$Germanium/$^{68}$Gallium generators and more economic and smaller cyclotrons.

The data obtained show that there is a relatively small number of 64 SPECT-CT scanners compared to 194 SPECT, with only 24.8% being multi-modality equipment.

These numbers lead us to two questions: Is the number of SPECT-CT and PET-CT scanners available adequate? and What objective criteria should be used to declare equipment obsolete? To answer the first question we need reliable data from other countries and members of the European Association of Nuclear Medicine. We found no written document endorsing any European data. Nevertheless, different meetings of European delegates reported ratios of 150,000 inhabitants per gamma camera and 500,000 per PET scanner. In relation to the second question, we suggest a detailed reading of the policy on replacement criteria of the MHRA. Regulating Medicines and Medical Devices, April 2014 These criteria are:

- Seriously damaged or worn out equipment, the repair of which would be beyond economic criteria.
- Unreliable equipment (check service history).
- Clinical or technical/technologic obsolescence.
- Changes in legal or local policies related to the use of the equipment.
- Manufacturer cannot supply replacement material.
- Impossibility to correctly replace parts of the equipment.
- The equipment cannot be repaired by the product specialists.
- End user opinions.
- Tangible benefits with replacement by new model/equipment (features, usability/functionality, clinical effectiveness, lower costs).
- Recommended life cycle/functioning of the equipment.

Finally, with the MHRA criteria and the data provided by the companies commercializing HT Nuclear Medicine equipment in Spain, we can speculate that nine of the PET scanners currently available should be replaced by PET-CT equipment; in addition, scanners should be provided to the ACs lacking sufficient equipment. As specialists in Nuclear Medicine we know that PET-CT equipment of more than 5 years of length of service has a technological gap related to the new recently launched PET-CT scanners which have undergone very important improvements in detectors and “time of flight” and “digital” technology. Investment in this new
equipment will be necessary within the next years to improve the clinical efficiency of this technology.

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References