

Practice of nuclear medicine in Spain

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Abstract. This survey presents the results of a poll sent to all Spanish nuclear medicine departments between July 1999 and March 2000, with the aim of clarifying the current situation of nuclear medicine in Spain. This survey is believed to be the first of its kind, and it is anticipated that the data will be of assistance to health authorities in ensuring that the needs of the population with regard to nuclear medicine facilities are met.

Keywords: Nuclear medicine – Spain – Poll

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Introduction

This work presents the results of a poll that was addressed to all Spanish nuclear medicine departments (NMDs) between July 1999 and March 2000. The study, done under the auspices of the Spanish Nuclear Medicine Society, was designed with the aim of documenting the current situation of nuclear medicine in Spain. The ultimate purpose is to use the obtained data as a basis for providing information to the Spanish health authorities that will enable them to ensure that the number of NM facilities, the equipment and the personnel are adequate to meet the needs of the population.

Poll design

The questions in the poll were classified into six different groups:

- Characteristics, size and ownership of the facility
- Personnel: nuclear medicine specialists, radiopharmacists and radiophysicists
- Equipment: supplier, age and number of items of equipment
- Examinations and treatments performed in 1998, and if possible the type of procedures
- Research activity: published papers, congress presentations
- Rate of compliance with the Spanish law 1841/97 concerning quality assurance in nuclear medicine

Country

Spain is a European Union country, located in the south-west of Europe. Its surface is about 500,000 square kilometres and its population is about 40,000,000. Administratively it is divided into 17 so-called autonomous regions.

The results of the poll are presented according to autonomous region, and population data are the official government data from 1993.

Data collection

To run the poll the whole country was distributed among 12 people. Each member was responsible for an area –

Fig. 1. Distribution of nuclear medicine departments (NMDs) throughout Spain (in 17 autonomous regions). Note: In this and all subsequent maps the Canary Islands are located in the box to the lower right, and the number within this area indicates the figure for that community

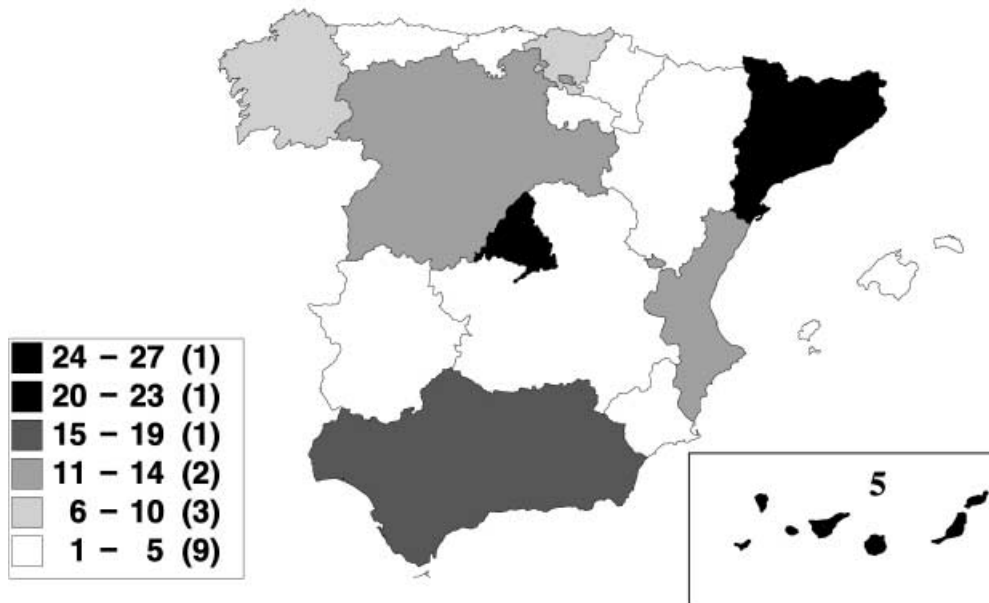
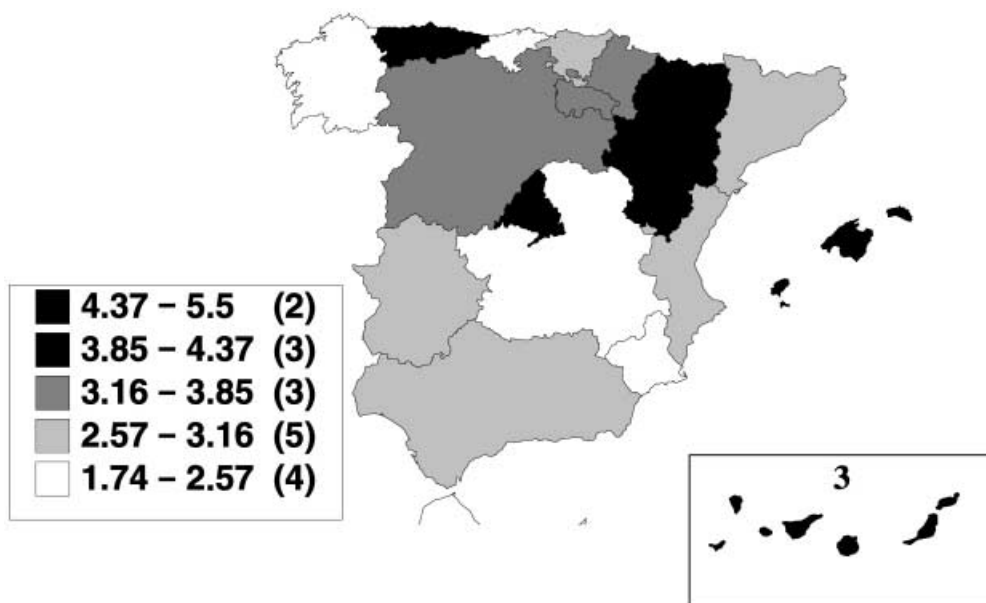


Fig. 2. Number of NMDs per million inhabitants



smaller or larger depending on the estimated number of NM centres in the area – and made personal contact with all centres.

The data presented correspond to the activity (procedures and research performed) and equipment the centres had in 1998 and 1999.

Results

We were able to collect complete data from 101 out of the 128 nuclear medicine centres. Data were obtained from all centres with regard to the number of gamma cameras, ownership (private/public) and whether the centre was a university facility.

Seventy-eight of the 128 NMDs were located in a hospital; the remaining 50 were independent centres, some of which were associated with another imaging facility. Forty-five out of the aforementioned 78 NMDs were in university hospitals, and in 61 cases the owner was the National Health Service. The mean area of the NMDs was 400.7 m².

Concerning education, 41 were accredited for a nuclear medicine residence programme, 10 for radiopharmacy and 11 for radiophysics.

Radioimmunoanalysis is done in 45 of the NMDs and 18 also perform densitometry.

Only 3 of the 101 NMDs that provided complete responses to the questionnaire have somebody on duty 24 hours a day. In 24 cases the department is open for

Fig. 3. Number of gamma cameras per million inhabitants

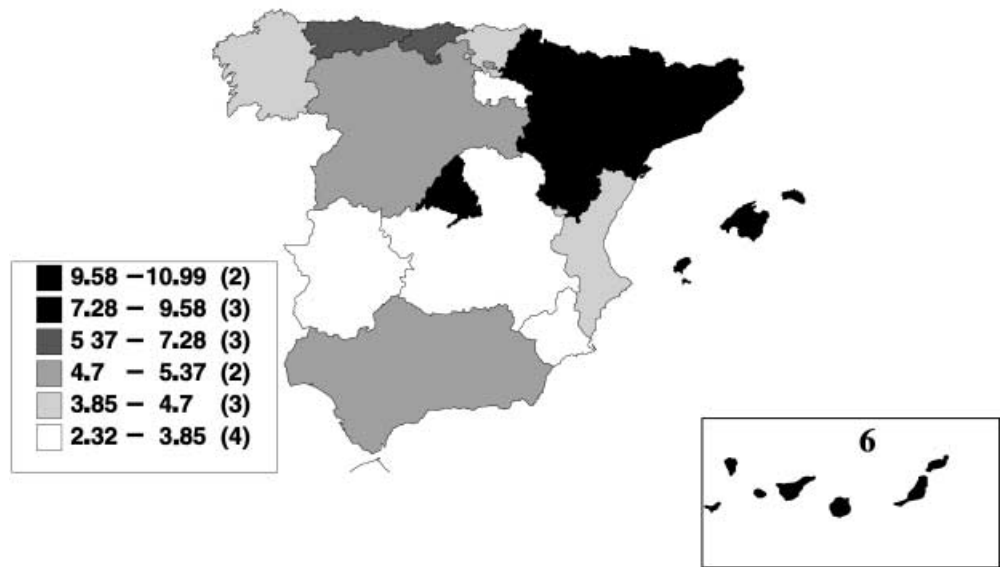
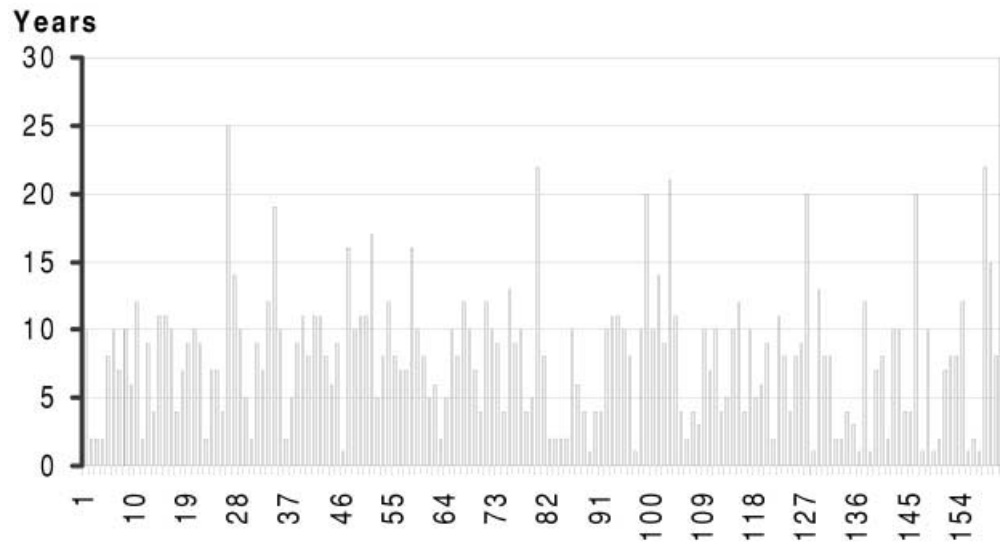


Fig. 4. Age of individual gamma cameras (see text for mean, median and range)



Mean: 7.8 ± 4.8, median: 8, range: 0 - 25 years

between 9 and 14 hours per day, and the remaining 74 centres (73.3%) are open no more than 8 hours per day

Thirty-seven NMDs have therapy facilities (with at least one room dedicated to therapy). Only 22 (59.5%) of these 37 have somebody on duty 24 hours a day (in seven cases the doctors are in the hospital and in 15 they are available on phone request).

Distribution of nuclear medicine departments

Figure 1 shows the number of NMDs in the 17 autonomous regions. Figure 2 shows the number of NMDs per

1,000,000 inhabitants, again according to autonomous region. The mean for the whole country is 3.2. In the European Union as a whole the figure some years ago ranged from 1 to 11, as reported by Askienazy in 1993 [1].

PET facilities

The first Spanish cyclotron and PET facility was opened in November 1995. Today there are six PET gamma cameras (two in Madrid, one in Pamplona, one in Bilbao, one in Barcelona and one in Valencia) and two cyclotrons (one in Madrid and one in Pamplona). Three more

Fig. 5. Number of gamma cameras per NMD in each of the autonomous regions

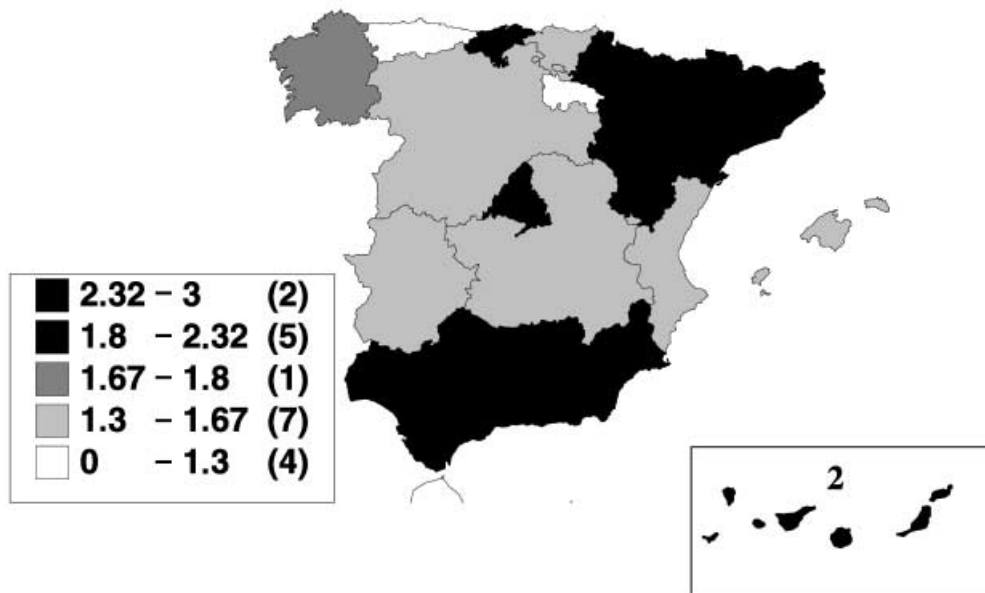
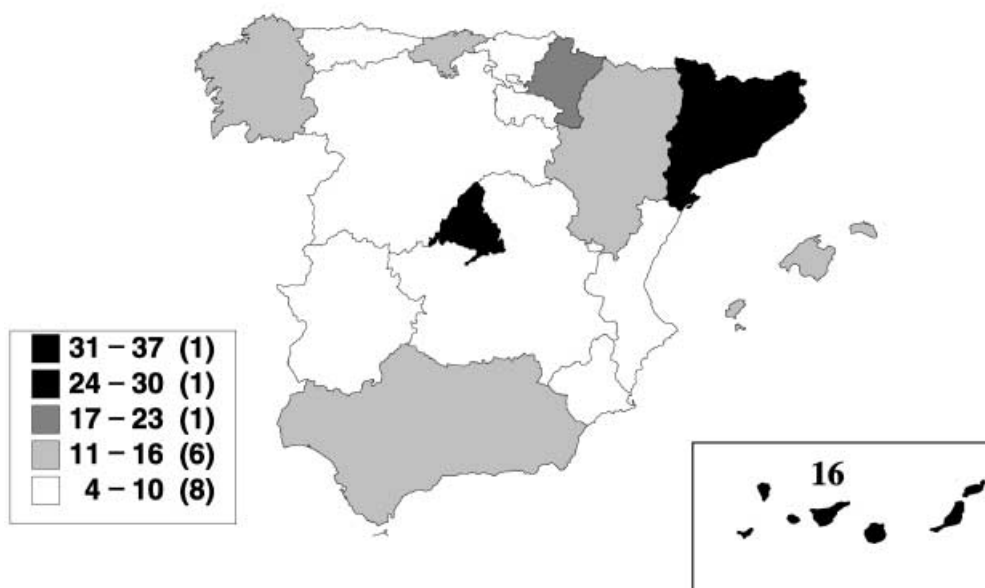


Fig. 6. Number of procedures performed per 1,000 inhabitants



cyclotrons are being built, and about 11 more PET cameras are expected for the year 2001.

Equipment

Figure 3 shows the number of gamma cameras per 1,000,000 inhabitants in each autonomous region. The mean for the whole country is 5.6, while the range within the European Union reported by Askienazy in 1993 [1] was 2–23.

From the results of the questionnaire we know the age of 165 of the 233 gamma cameras installed in Spain. The mean age is 7.8 ± 4.8 years, the median 8 years and the range 1–25 years. Figure 4 shows the age distribution.

The number of gamma cameras per NMD in each autonomous region is shown in Fig. 5. Countrywide the mean is 1.7 and in the European Union it ranges from 1.6 to 3.1 [1].

Procedures

A total of 732,543 procedures were performed in Spain during 1998. Figure 6 shows the number of diagnostic procedures per 1,000 inhabitants for each autonomous region. The mean for the whole country is 16.7, while the range reported by Askienazy for the European Union was 3–40.

The number of procedures performed per gamma camera is shown in Fig. 7. In the above-mentioned publi-

Fig. 7. Number of procedures performed per gamma camera

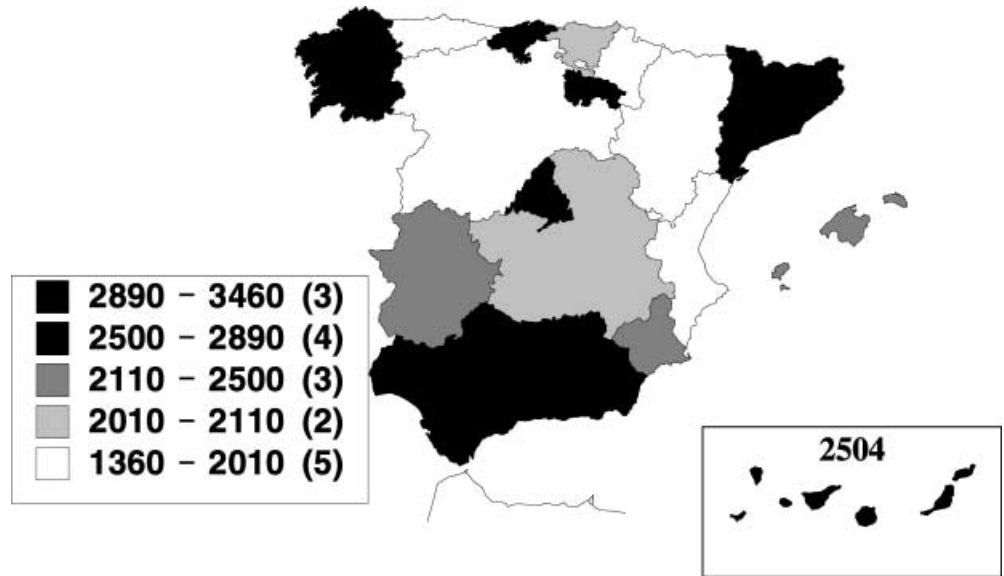
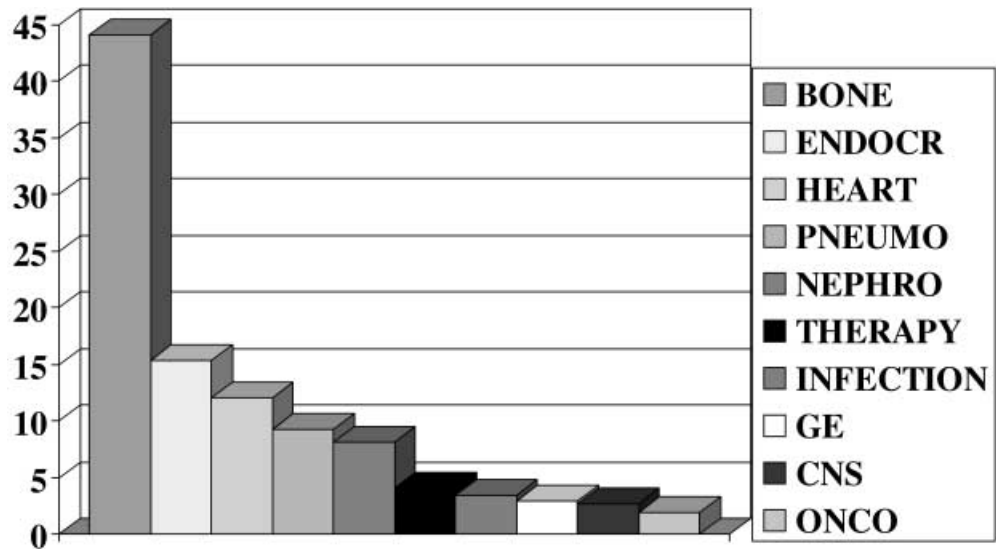


Fig. 8. Percentage of procedures performed, according to organ system. Bone, osteoarticular; Endocr, endocrinology; Heart, cardiology; Pneumo, pneumology; Nephro, uro-nephrology; Therapy, radionuclide therapy; Infection, inflammation/infection; GE, gastroenterology; CNS, central nervous system; Onco, oncology



cation of Askienazy, the range for the EU was 756–2310, while the mean for Spain in our poll is 2505.

About 50% of the centres were able to classify the procedures performed (including therapeutic) according to the organ involved. The breakdown of these procedures (total = 398,627) is shown in Fig. 8.

The number of therapeutic procedures per 1,000,000 inhabitants is shown in Fig. 9. The countrywide mean is 216, and in four regions the figure exceeds 383. In Europe the mean is 191, according to figures published by the EANM Therapy Task Group [2].

Professionals

Figures 10, 11 and 12 show the distribution of nuclear medicine specialists, radiopharmacists and radiophysi-

cists in the country. The total number of each type of specialist (excluding residents) in Spain is 314, 32 and 19, respectively.

Research activity

The centres were asked about (a) the number of presentations to national and international meetings (oral and poster), (b) the number of indexed and non-indexed publications and (c) whether clinical sessions were performed in the department. The answers received indicated that, in 1998, 322 presentations were made to national scientific meetings and 151 to international ones. In the same period the number of indexed publications was 167, while 97 were not indexed. Fifty-one centres (50.5%) run clinical sessions, most of them (41/51) in the public sector.

Fig. 9. Number of therapeutic procedures per million inhabitants

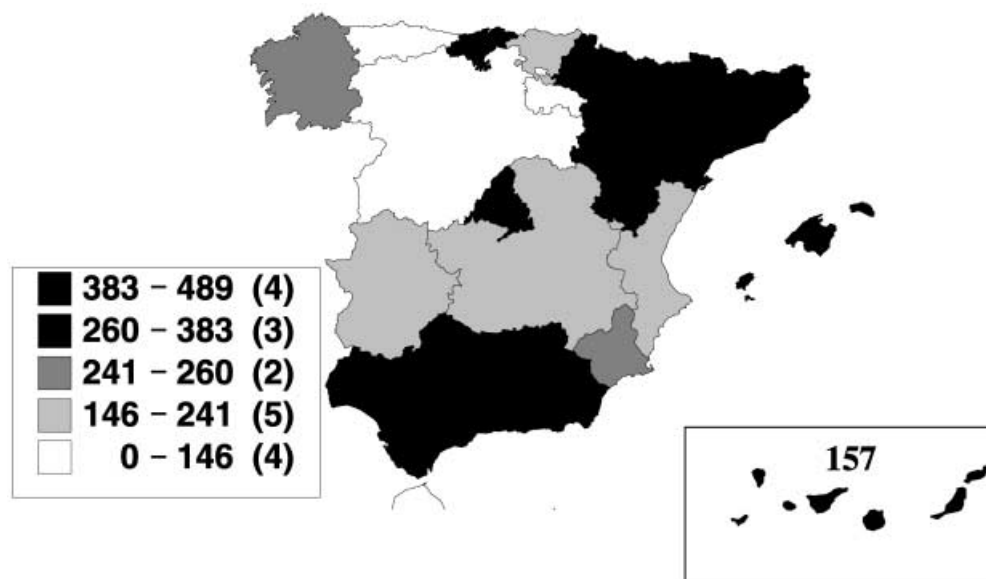
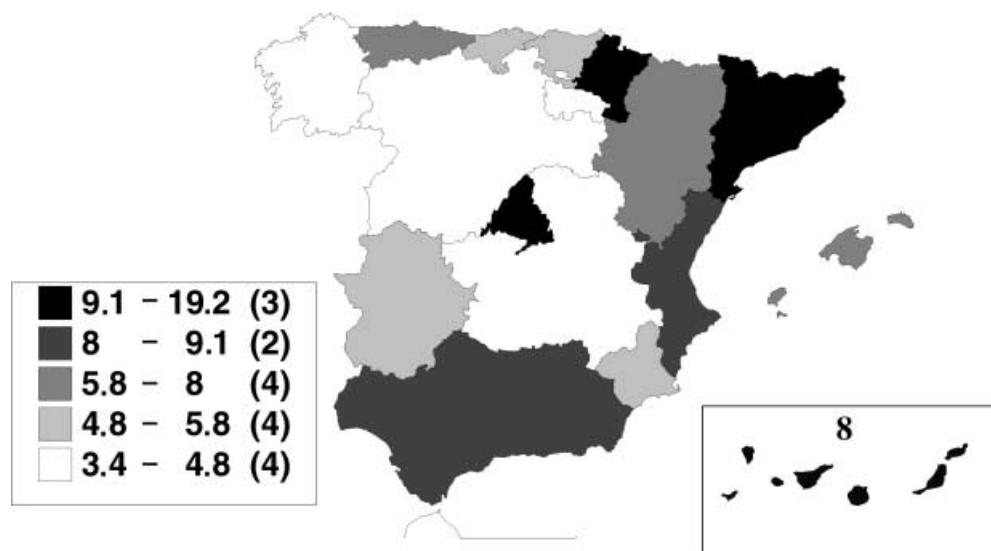


Fig. 10. Number of nuclear medicine specialists per million inhabitants



Quality assurance

The final part of the questionnaire asked the centres about the rate of compliance with the so-called quality assurance law, which has applied to all NMDs since December 1999. The options were <50%, 50%, 75% and 100%. Only 6 NMDs answered 100%, 16 answered 75%, 55 answered \leq 50% and 22 did not answer

Discussion

This study represents the first attempt to clarify the reality of NM practice in Spain, and we know of no publications of this type concerning any other European country. It would be desirable to run this or a similar questionnaire through all EANM countries, thereby helping to clarify the Europe-wide situation.

As expected, the larger and more densely populated regions had the highest number of gamma cameras. Nevertheless, as shown in Fig. 2, this distribution did not always match the distribution per 1,000,000 inhabitants. Spain is in the low range for the EU, and more than 50% of the regions are below the Spanish mean (9 out of 17).

It is difficult to comment on the number of PET centres. Spain got its first cyclotron and PET unit in 1995. The private sector has been the initial motor in this respect, but it is hoped that in the next year the public health service will acquire some PET facilities in different regions; in addition, some further private units should commence operation by the end of 2000. More comments on this evolution will be possible after the next study.

Concerning education, Nuclear Medicine is a 4-year programme for which the NMD is responsible. In the

Fig. 11. Number of radiopharmacists per autonomous region

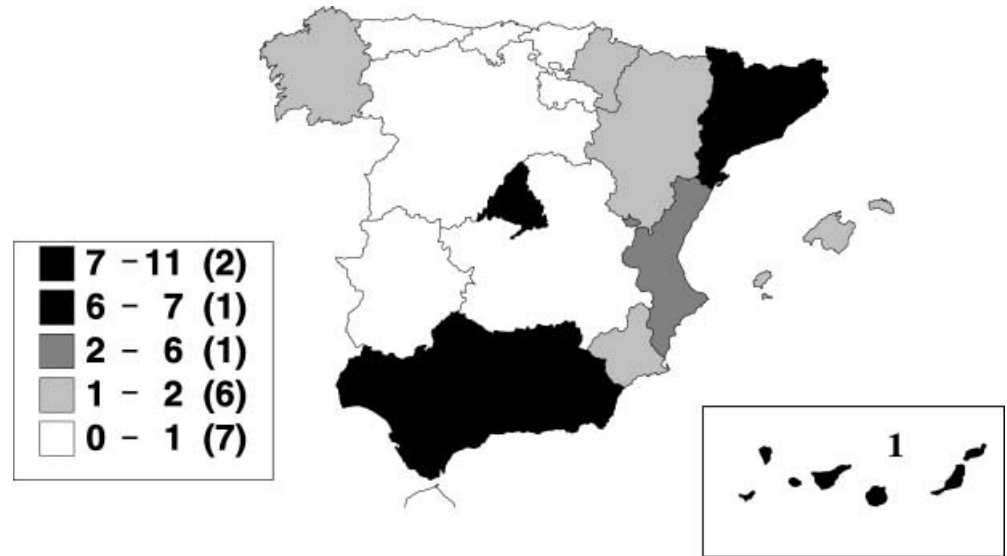
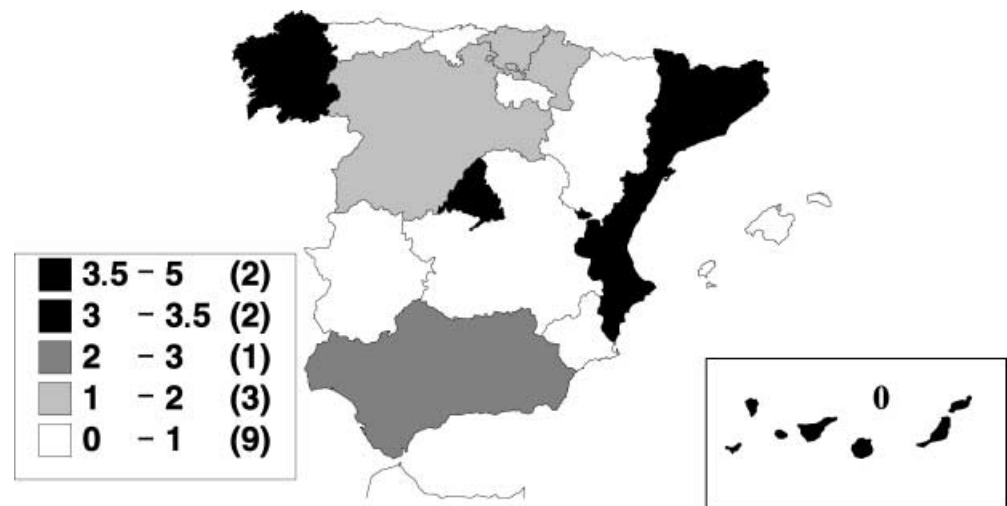


Fig. 12. Number of radiophysicists per autonomous region



case of radiopharmacy, the programme lasts for 2 years and is open to pharmacists and chemists; radiopharmacy accredited units are part of NMDs. Finally, the radiophysics programme is also a 2-year programme, but in most, if not all, cases the NMD is just a collaborator in the programme, and the radiation protection or the radiophysics department is responsible for the programme.

Only one (Madrid) out of the 17 regions has achieved the recommended mean ratio of 10 gamma cameras per 1,000,000 inhabitants. However, even this figure is probably an overestimate because the real population of Madrid is clearly above the registered figure. In three autonomous regions the ratio is below 4. In addition, the age of the gamma cameras seems to be too high. It is true that most of them are SPET cameras, but the mean age of nearly 8 years seems unsatisfactory.

The low number of gamma cameras is reflected in the number of gamma cameras per NMD and in the number of procedures per gamma camera. In respect of the latter

parameter, Spain is in the high range within the EU, and this was already the case in the above-mentioned Askienazy publication, where the highest ratio, 2505, was the Spanish one. The results of this poll indicate that the gamma camera pool should be increased and that some cameras should be replaced with new ones.

The number of therapeutic procedures performed per 1,000,000 inhabitants in Spain is high, exceeding the European mean (2). In spite of this, the number of NMDs that are open 24 hours a day is still limited. The presence of the NM specialist at the hospital seems necessary while patients are treated with radionuclides. This aspect requires attention, especially if nuclear medicine therapy develops as expected in the coming years.

The numbers of NM specialists, radiopharmacists and radiophysicists needs to be compared with the situation in other countries and possibly some advice to the health authorities could be offered by the EANM. Unfortunately, we do not know the figures for other countries.

Finally, the answers about quality assurance do not reflect a lack of quality in Spanish NMDs. Rather, they reflect the fact that most of the centres were on their way to implementing the Spanish law at the time the poll was run. We know that most of the centres, especially public ones, have now implemented it.

We are well satisfied with the poll itself and its results. Some of our colleagues have already used it at the regional level, and the Spanish Nuclear Medicine Society is planning to present it to the health authorities and advise them on the real needs of our country in relation to nuclear medicine practice.

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