

Title:

Training in Ultrasound for Resident Physicians in Gastroenterology: a survey and training project by the Spanish Association of Digestive Ultrasound (Asociación Española de Ecografía Digestiva - AEED)

Authors:

Concepcion González de Frutos, Eva Marín Serrano, Mariano Gómez-Rubio, Manuel Crespo Sánchez, Francisco Javier Álvarez-Higueras, Gregorio Castellano-Tortajada

DOI: 10.17235/reed.2019.6172/2019

Link: [PubMed \(Epub ahead of print\)](#)

Please cite this article as:

González de Frutos Concepcion, Marín Serrano Eva, Gómez-Rubio Mariano, Crespo Sánchez Manuel, Álvarez-Higueras Francisco Javier, Castellano-Tortajada Gregorio. Training in Ultrasound for Resident Physicians in Gastroenterology: a survey and training project by the Spanish Association of Digestive Ultrasound (Asociación Española de Ecografía Digestiva - AEED). Rev Esp Enferm Dig 2019. doi: 10.17235/reed.2019.6172/2019.



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

OR 6172 inglés

Training in Ultrasound for Resident Physicians in Gastroenterology: a survey and training project by the Spanish Association of Digestive Ultrasound (Asociación Española de Ecografía Digestiva - AEED)

Concepción González de Frutos¹, Eva Marín Serrano², Mariano Gómez Rubio³, Manuel Crespo Sánchez⁴, Javier Álvarez Higuera⁵ and Gregorio Castellano Tortajada⁶

Department of Gastroenterology and Hepatology. ¹Hospital Virgen de la Salud de Toledo. Toledo, Spain. ²Hospital Universitario La Paz. Madrid, Spain. ³Hospital Universitario de Getafe. Getafe, Madrid. Spain. ⁴Hospital San Agustín. Avilés, Asturias. Spain. ⁵Hospital Clínico Universitario Virgen de la Arrixaca. Murcia, Spain. ⁶Hospital Universitario 12 de Octubre. Madrid, Spain. ^{1,2,3,4,5,6}Members of the Board of Directors of the Asociación Española de Ecografía Digestiva (AEED) 2017-2018

Received: 24/01/2019

Accepted: 21/03/2019

Correspondence: Concepción González de Frutos. Department of Gastroenterology. Hospital Virgen de la Salud. Avd. Barber, 30. 45071 Toledo, Spain
e-mail: cgdefrutos@hotmail.com

ABSTRACT

Background: the training program of the gastroenterology specialty that is mandatory for resident physicians, obliges them to be proficient in diagnostic and therapeutic digestive ultrasound tools.

Methodology: the Asociación Española de Ecografía Digestiva (AEED) performed a survey of the 93 Departments of Gastroenterology with training programs for resident physicians in gastroenterology, in order to assess the exact situation of training in digestive ultrasound in Spain.

Results: only 31 of the 93 (33%) Departments of Gastroenterology were able to provide training in Digestive Ultrasound. Moreover, 33% (48 out of 148) of the residents in gastroenterology did not receive specific training in digestive ultrasound. Whereas, 31% (46 out of 148) had received some specific training, but with ample room for improvement. These deficiencies were spread throughout the Spanish regions (Autonomous Communities) in an uneven manner, with almost half totally lacking gastroenterology departments that were capable of providing digestive ultrasound training.

Conclusions: there is a significant deficit of gastroenterology departments capable of providing training in digestive ultrasound to residents, causing a significant training inequality. Until this situation can be reversed, the AEED has designed a training project in digestive ultrasound aimed at providing adequate training to all residents in gastroenterology as required.

Key words: Abdominal ultrasound. Resident physicians. Training in ultrasound.

INTRODUCTION

The current training program for the gastroenterology specialty that is mandatory for resident physicians, was drafted by the National Commission Medical Specialty of Gastroenterology (NCG) in Spain. It was subsequently ratified by the National Council of Specialties in Health Sciences and the Human Resources Commission of the National Health System and published in the Official Gazette by the Ministry of Health and Social Policy in 2009 (Ministerial Order SAS/2854/2009 of October 9) (1). The document contains the following statements: "the resident physician should master the diagnostic and therapeutic ultrasound"; "(...) (s) he must acquire sufficient knowledge and skills to be able to perform it in his (her) professional practice"; and this skill must be demonstrated "a minimum of two months in the third year of residency", the estimated number of examinations necessary to achieve an adequate training is "200 ultrasound scans".

The results of a survey performed in 2012 by the Asociación Española de Ecografía Digestiva (AEED - Spanish Association of Digestive Ultrasound) for the Departments of Gastroenterology (DG) with training programs for Resident Physicians in Gastroenterology (RG) concluded that

ultrasound training was very disparate and often insufficient. This was thought to be mainly motivated by the insufficient implementation of digestive ultrasound (DU) in DG in Spain (2). There are limitations to this study as it was performed a few years ago and furthermore, data was not collected from all DG with a resident training program. Thus, the exact magnitude of the problem was unknown.

The AEED is the scientific society that represents all Gastroenterologists who practice and/or have an interest in digestive ultrasound. According to its bylaws, one of its functions is to contribute to the training, diffusion and expansion of DU. In 2016, the Board of Directors decided to assess the exact dimension of the problem in order to offer a learning solution due to the existing deficiencies in DU training for residents in gastroenterology. As a result, the AEED performed a survey during 2017 and obtained data from all the accredited centers for residency training. Subsequently in 2018, they planned and designed a theoretical-practical course in DU aimed at residents who are currently not receiving adequate training. Both the survey and the course are discussed below.

I. A SURVEY ON TRAINING IN DIGESTIVE ULTRASOUND FOR RESIDENT GASTROENTEROLOGISTS

Methodology

The Board of Directors of AEED performed a survey of the 93 accredited DG for residency training in Spain (Table 1) between April and December 2017. The survey was performed by email or personal interviews (telephone or face to face) with members of each DG with sufficient knowledge of the situation of DU in their Service, as well as their DU residency training programs. All the respondents were informed about the purpose of the survey as follows. The AEED intended to assess the real situation of DU in the DG of Spain and the results were to be broadly disseminated among specialists and health authorities.

Three types of information were collected in all DG:

1. Existence (or absence) of a DU service and in the affirmative, activities performed: number of scans per month and performance (or not) of ultrasound-guided interventional procedures.

2. Number of RG per year in each hospital, as well as the place and duration of their DU training.
3. Ability to provide DU training for their own residents as well as for other hospitals.

Results

Analysis by Departments of Gastroenterology (DG)

Of the 93 DGs with a resident training program in Spain in 2017, 48 (52%) were active in DU while the other 45 (48%) were not. Of the 48 active DGs, DU activity was scarce, variable and not performed on a daily basis in 17 centers. Thus, they were incapable of providing adequate DU resident training. Therefore, the DGs were classified into three types (Fig. 1), depending on their DU training capacity and the Medical Service in which their residents were trained:

- Type 1: 31 of the 93 DGs (33%) with a DU service capable of providing DU resident training. These were subdivided into two subtypes:
 - Type 1A: 15 DGs (16%) with a high DU activity, allowing them to train their own residents and those from other hospitals.
 - Type 1B: 16 DGs (17%) with a moderate activity in DU, allowing them to train their own residents only.
- Type 2: 58 of the 93 DGs (62%) did not have DU units or performed enough DU activities in order to train their own residents, therefore they were trained at other Medical Services. These were also subdivided into two subtypes:
 - Type 2A: 32 DGs (34%) whose residents received specific DU training at another external DG.
 - Type 2B: 26 DGs (28%) whose residents received training at a Department of Radiology
- Type 3: 4 out of the 93 DGs (5%) did not have DU and their residents did not receive any training in ultrasound.

Analysis by Resident Physicians in Gastroenterology (RG)

The number of RG positions that are offered each year is roughly similar and 148 positions were offered in 2017. According to the classification of the DGs previously introduced and the

distribution of residents in each hospital, the 148 residents were classified in one of the following groups (Fig. 2):

- Group 1: 54 residents (36%) received DU training at their own Department:
 - Group 1A: 32 residents in type 1A DG (22%), with an average rotation time of 3.7 months.
 - Group 1B: 22 residents in type 1B GS (14%), with an average rotation time of 3.3 months.
- Group 2: 87 residents (59%) received DU training outside their Service. Among them:
 - Group 2A: 46 residents (31%) received specific DU training at another DG, with an average rotation time of 2 months.
 - Group 2B: 41 residents (28%) received training at a Department of Radiology. The average rotation time was 1.7 months and they received general training in different imaging techniques (ultrasound, tomography, resonance), without specific and active training in DU.
- Group 3: 7 residents (5%) did not receive any DU training at all because it was not included in their DG's training plan.

Therefore, 100 residents (67%) received specific training in DU (groups 1A, 1B and 2A), while 48 (33%) did not receive specific training in DU, including 7 who did not receive any training at all (groups 2B and 3). Furthermore, more than half of all residents (53%, those in groups 1A and 2A) were trained at only 16% of the existing DGs (15 of the 93 type 1A DGs).

Regional analysis

The number of DGs with sufficient capacity to train their residents in DU (Departments type 1A and 1B) and the number of residents enrolled therein (which could therefore be DU-trained at their own Department) was very variable among the Spanish regions (Autonomous Communities as they are officially designated) (Table 2 and Fig. 3). All the regions lacked a capacity for adequate DU training of their residents. However, there was a significant variance among them as follows.

- Three regions (Murcia, Madrid and Asturias) were almost self-sufficient, covering between 77% and 80% of their training needs.
- Five Autonomous Communities (Extremadura, Castilla La Mancha, Andalusia, Aragón and Castilla León) had a low-to-medium capacity, as only 33% to 50% of their centers were prepared to provide this training. They trained 33-57% of their residents.
- One region (Galicia) had very low capacity, as only 1 of its 6 DGs (17%) could provide this kind of training.
- Eight Autonomous Communities (Canary Islands, Cantabria, Catalonia, Valencia, Balearic Islands, La Rioja, Navarre and the Basque Country) had zero capacity, i.e., no single DG was able to provide DU training to its residents.

II. A PROJECT BY THE ASOCIACIÓN ESPAÑOLA DE ECOGRAFÍA DIGESTIVA (AEED) FOR ULTRASOUND TRAINING TO GASTROENTEROLOGY RESIDENTS

General aspects

The training project in DU for residents was designed by the AEED with the mission of temporarily mitigating current training deficits of gastroenterology residents, until the deficient situation of DGs with training capacity in DU can be resolved. The goal is that 100% of residents receive the theoretical and practical DU training as required by current regulations, allowing them to integrate abdominal ultrasound in their clinical practice. Thus, setting the basis upon which they will build their professional development in DU.

The project has a DU course for residents with theoretical and active practical training, which is organized and coordinated by the AEED, with the endorsement of the Scientific Societies of Digestive Diseases (SEPD, AEEH, AEG, SEDU, AESPANC and GEMD) and the Spanish Federation of Ultrasound Societies in Medicine and Biology (FESUMB).

A Course in Digestive Ultrasound

The course has two levels of increasing complexity, basic and advanced. Each level is composed of a theoretical module (taught online through the AEED website: <https://www.ecodigest.net/>) and a practical module consisting of the performance of ultrasound procedures under the

supervision of a DU expert. The syllabus of the theoretical modules (Table 3) has been developed by expert gastroenterologists. The residents must pass an exam on the theoretical content before moving to ultrasound practices. The minimum number of ultrasound tests required to pass the basic module is 50 and 200 for the advanced. It is not possible to take the advanced course without having previously passed the basic one.

A network of training centers

A network of 19 training centers has been set up to provide practical DU training. These are DG selected by the AEED as they have a high DU activity (over 120 scans per month). This learning network, according to the results of our survey, should offer DU training to the 48 residents (33%) in group 2B (currently trained at Department of Radiology) and 7 in group 3 (currently without any DU training). In addition, when more suitable centers are available, DU training should also be offered to Group 2A trainees (46 residents, or 31%) in DGs that are less saturated and closer to their home.

The practical part of the course may be completed in one single month if the training center performs more than 250 scans per month, whereas two months will be needed in training centers that perform between 120 and 250 digestive ultrasounds per month. Taking this into account, our calculations indicate that the teaching network can ensure 104 rotations a year of residents, which should cover all the practical DU training needs for the entire resident population.

The AEED continues to work on the recruitment of training centers to broaden its DU training network, allowing rotation in nearby centers to a greater number of residents.

DISCUSSION

DGs with a teaching accreditation should ensure that their residents receive training in DU that is in accordance with the current program curriculum for gastroenterologists-in-training (1). However, the results of our survey show that currently, DU teaching to a significant number of residents is deficient as it does not conform to the recommendations of the program referred to in the introduction of this article. In fact, 48 of the 148 residents (33% from groups 2B and 3)

did not receive any specific and active training in DU. They were provided with a general training in radiological imaging techniques, as mere observers and for an average period of less than 2 months. Sometimes they did not receive any training in ultrasound at all. In fact, this was the case for 7 residents that represent 5% of the total. Very similar findings were obtained by the previous AEED survey, performed in 2012 (2): The quality of the training perceived by the MIR-AD, which was formed in the Radiology Services, was lower than that of residents that were trained in DGs (1.85 vs. 3.77 on a 5 points scale).

According to our survey, another 31% (46 of the 148 residents belonging to group 2A) received specific DU training but in poor conditions. They received DU training in 15 type 1A DGs that simultaneously catered to their own 32 residents. Consequently, the few DGs providing training were saturated and often located far from the physicians' city of residence or their hospital, making it impossible for them to perform the "doctor on call" services. These deficiencies in DU residency training are mainly caused by the inexplicably reduced number of DGs with a DU service that is sufficiently active to provide training.

In the 1990s, DU was recognized as a specific technique of the Gastroenterology Specialty by the health Administration and the National Commission of Gastroenterology (NCG). As a result, the health administration and the NCG recommended the incorporation of DU to all DGs, especially those with resident doctor training. Thus, DU was included by the Ministry of Health in consecutive resident training programs for the gastroenterology specialty and in the gastroenterology services portfolio (3). The Guide of Standards and Recommendations for the Quality and Safety in Gastroenterology Units, published in 2013 by the Ministry of Health, continued to advise to inclusion of Abdominal Ultrasound in the portfolio of services. The hospital of local/community healthcare units with < 100,000 inhabitants should have a diagnostic abdominal ultrasound office and the health area-type hospitals with \geq 250,000 inhabitants should also have a conventional interventional ultrasonography room (4). The DU was incorporated to DGs in the 1990s, in response to the recommendations of the health authorities and the NCG. However, the incorporation was incomplete, irregular and very dependent on local decisions. These were influenced by budget constraints, the resistance of radiology departments, the absence of an urgent need for care when covered by the radiology

service and a lack of initiative by the local and health authorities.

The exact number of DGs without a DU unit is unknown. A survey by the Spanish Association for the Study of the Liver was performed in 2014 and published in 2015 as the *White Paper on Hepatology in Spain* (5). 161 hospitals participated in this study, which showed that 44% of DGs had abdominal ultrasound. However, the survey did not inquire about the training capacity for residents of these DU service. The Spanish Society of Digestive Pathology performed another survey in 2016 that was published in 2017 as the “RECALAD report” (Resources and Quality in Digestive Diseases). There were 58 responses out of the 171 DGs across Spain to which the survey was sent and this study found that only 14 of the 58 respondents (24%) had a Digestive Ultrasound service (6). Our survey of 93 DUSs with residency training indicates that although 48 training DGs (52%) had activity in DU, DU activity was insufficient to provide training in 17. Thus, only 33% (31 of the 93) had a DU unit with sufficient capacity to train residents.

In summary, all the surveys carried out so far indicate the following: a) an unknown number, but less than half of all DGs, have a DU service (24-44%); and b) only 33% of the DGs with a training program in the specialty of gastroenterology have a DU service with the capacity to train residents.

These results are striking and even inexplicable due to two reasons. First and as already noted, 20 years have passed already since the Ministry of Health and the NCG recommended the implementation of DU in all DG, especially in those with resident training. The implementation in our portfolio of services is even more important nowadays as new technologies are being added to the ultrasound system such as elastography, contrasts and their quantification or the use of linear probes in inflammatory bowel disease (IBD). Furthermore, new therapeutic options under ultrasound control are also being introduced that make it an essential tool in the development of our specialty. Secondly and paradoxically, while the implementation of DGs has remained stagnant for about 20 years due to its characteristics (simple, fast, accessible, innocuous, economical and high diagnostic capacity and, sometimes, therapeutic), ultrasound has progressively extended its scope to practically the entire human body. In fact, it is currently a common and expanding technique in most medical and surgical specialties (Anesthesia, Angiology, Gastroenterology, Cardiology, Dermatology, Emergencies, Endocrinology, Intensive

Care, Internal Medicine, Pneumology, Primary Care, Obstetrics and Gynecology, Radiology, Rehabilitation, Rheumatology, Surgery (intraoperative ultrasound), Traumatology and Urology). Therefore, ultrasound has become a cross-sectional medical technique that can be performed by physicians of most specialties. For the same reason, training in ultrasounds for the entire human body has been incorporated into the study plans of numerous medical schools across the world (7,8), including Spain (9).

The deficit of DGs with resident training programs and training capacity in DU unequally affects the different regions (Autonomous Communities) of Spain. Although none have the capacity to cover all their resident training needs, the deficit is more pronounced in the Balearic Islands, Canary Islands, Cantabria, Catalonia, La Rioja, Navarre, Basque Country and Valencia. These regions do not have any DG with a DU service capable of training. This situation should be reversed and as a minimum, DGs with a resident training program should have a DU service capable of teaching. The NCG, the AEED and other Spanish scientific societies of the specialty of Gastroenterology (SEPD, AEEH, AEG, SEDU, AESPANC, GEMD) and the Health Authorities of the various Autonomous Communities should be involved in this process. In this sense, all these scientific societies, the Federation of Spanish Medical Scientific Associations and FESUMB, have already signed a document addressed to the health administration of the National Ministry of Health and the Regional Health Authorities requesting that the necessary measures be taken to reverse this situation. However, while the situation holds, it is urgent and necessary to offer adequate DU training to all residents. The AEED has the obligation to ensure, promote and facilitate DU training and be aware of the learning needs of our residents. In fact, a learning project has been designed in DU that will provide adequate teaching to all trainees.

In conclusion, the lack of DGs with the ability to provide adequate training in DU results in poor training in a significant number of residents. The AEED has developed a DU course that can meet this need.

ACKNOWLEDGMENTS

The authors and the members of the board of directors of the AEED would like to express their gratitude to each of the doctors of the 93 hospitals that have collaborated in the survey.

Accepted Article

REFERENCES

1. Ministerio de Sanidad y Política Social: Orden Ministerial SAS/2854/2009, de 9 de octubre, por la que se aprueba y publica el programa formativo de la especialidad de Aparato Digestivo. Boletín Oficial del Estado de 26 de octubre de 2009.
2. Macías M. Encuesta sobre actividad docente en técnicas ecográficas para residentes de aparato digestivo. XXIV Jornada Nacional de Ecografía Digestiva de la AEED. Madrid 19- 20 de abril de 2013.
3. Ministerio de Sanidad y Consumo. Instituto Nacional de la Salud: Catálogo de técnicas y procedimientos del sistema de información. Cartera de servicios SICAR (ISBN: 84-351-0385-4). Madrid, 2002.
4. Ministerio de Sanidad, Servicios Sociales e Igualdad: Unidades asistenciales del Aparato Digestivo. Estándares y recomendaciones de calidad y seguridad. Informes, estudios e investigación, 2013. Centro de Publicaciones del Ministerio de Sanidad y Consumo. Disponible en: <http://publicacionesoficiales.boe.es>.
5. Asociación Española para el Estudio del Hígado (AEEH): Libro Blanco de la Hepatología en España. PORIB (ISBN: 978-84-617-3785-7), Madrid, 2015.
6. Sociedad Española de Patología Digestiva (SEPD) e Instituto para la Mejora de la Asistencia Sanitaria (IMAS): Encuesta sobre Recursos y Calidad en Aparato Digestivo (RECALAD), 2017.
7. Hoppmann RA, Rao VV, Poston MB, et al. An integrated ultrasound curriculum (iUSC) for medical students: 4-year experience. *Crit Ultrasound J* 2011;3:1-12. DOI: 10.1007/s13089-011-0052-9
8. Bahner DP, Royall NA. Advanced ultrasound training for fourth-year medical students: a novel training program at the Ohio State University College of Medicine. *Acad Med* 2013;88:206-13. DOI: 10.1097/ACM.0b013e31827c562d
9. García de Casasola G, Torres J, Casas JM, et al. Ecografía abdominal y educación médica. *Rev Clin Esp* 2014;214:131-6. DOI: 10.1016/j.rce.2013.09.006

Table 1. The 93 Departments of Gastroenterology with a training program for residents in Gastroenterology in Spain that took part in the survey

City	Hospital	City	Hospital
Andalucía		Community of Madrid	
Almería	C.H. Torrecárdenas	Alcalá de Henares	H.U. Príncipe de Asturias
Cádiz	H.U. Puerta del Mar	Alcorcón	H.U. Fundación Alcorcón
Córdoba	H.U. Reina Sofía	Fuenlabrada	H.U. de Fuenlabrada
El Ejido	H. de Poniente	Getafe	H.U. de Getafe
Granada	H.U. San Cecilio	Leganés	H.U. Severo Ochoa
Granada	H.U. Virgen de las Nieves	Madrid	H.U. Fundación Jiménez Díaz
Huelva	H. Juan Ramón Jiménez	Madrid	H. Central de la Defensa
Jaén	C.H. de Jaén	Madrid	H.G.U. Gregorio Marañón
Jerez de la Frontera	H. de Jerez de la Frontera	Madrid	H.U. 12 de Octubre
Málaga	H. Regional U. de Málaga	Madrid	H.U. Clínico San Carlos
Málaga	H.U. Virgen de la Victoria	Madrid	H.U. La Princesa

Marbella	H. Costa del Sol	Madrid	H.U. La Paz
Puerto Real	H.U. de Puerto Real	Madrid	H.U. Ramón y Cajal
Sevilla	H.U. Ntra. Sra. de Valme	Majadahonda	H.U. Puerta de Hierro
Sevilla	H.U. Virgen del Rocío	Comunidad valenciana	
Sevilla	H.U. Virgen Macarena	Alicante	H.G.U. de Alicante
Aragón		Castellón	H.G.U. de Castellón
Zaragoza	H.C.U. Lozano Blesa	Elche	H.G.U. de Elche
Zaragoza	H.U. Miguel Servet	Valencia	H. Arnau de Vilanova
Asturias		Valencia	H.C.U. de Valencia
Avilés	H.U. San Agustín	Valencia	H.G.U. de Valencia
Gijón	H.U. Cabueñes	Valencia	H.U. Politécnico La Fe
Oviedo	H.U. Central de Asturias	Valencia	H.U. Doctor Peset
Canarias		Extremadura	
La Laguna	H.U. de Canarias	Badajoz	C.H.U. de Badajoz
Las Palmas de Gran Canaria	H.U. Doctor Negrín	Cáceres	C.H. U. de Cáceres
Las Palmas de Gran Canaria	H.U. Insular de Gran Canaria	Galicia	
Santa Cruz de Tenerife	H.U. Ntra. Sra. de la Candelaria	A Coruña	C.H.U. A Coruña
Cantabria		Lugo	C.H.U. Xeral-Calde
Santander	H.U. Marqués de Valdecilla	Ourense	C.H.U. de Ourense
Castilla-La Mancha		Pontevedra	C.H.U. de Pontevedra
Albacete	C.H.U. de Albacete	Santiago de	C.H.U. Santiago de

		Compostela	Compostela
Alcazar de San Juan	C.H. Mancha Centro	Vigo	C.H.U. de Vigo
Ciudad Real	H.G.U. Ciudad Real	Islas Baleares	
Cuenca	H. Virgen de la Luz	Palma de Mallorca	H.U. Son Llätzer
Guadalajara	H.G.U. Guadalajara	Palma de Mallorca	H.U. Son Espases
Toledo	C.H. Toledo	La Rioja	
Castilla y León		Logroño	H. San Pedro
Burgos	C. A. U. de Burgos	Navarre	
León	C. A. U. de León	Pamplona	C.H.de Navarra
Palencia	C. A. U. de Palencia	Pamplona	Clínica Universitaria de Navarra
Salamanca	C. A. U. de Salamanca	Basque country	
Valladolid	H. C. U. de Valladolid	Barakaldo	H.U. Cruces
Valladolid	H.U. del Río Hortega	Bilbao	H.U. Basurto
Catalonia		Donostia-San Sebastián	H.U. Donostia
Badalona	H.U. Germans Trias i Pujol	Galdakao	H. U. Galdakao-Usansolo
Barcelona	H. Clínic	Vitoria-Gasteiz	H.U. Araba
Barcelona	H. de la Sta. Creu i Sant Pau	Región de Murcia	
Barcelona	H. del Mar Parc de Salut	Cartagena	C.H.U. Sta. M. ^a Rosell y Sta. Lucía
Barcelona	H.U. Vall d'Hebron	Murcia	H.C.U. Virgen Arrixaca
Girona	H.U. de Girona Dr. Josep Trueta	Murcia	H.G.U. Reina Sofía
Hospitalet de Llobregat	H.U. de Bellvitge	Murcia	H.G.U. José M. ^a Morales Meseguer

Lleida	H.U. Arnau de Vilanova		
Sabadell	H.U. Parc Taulí		
Tarragona	H.U. Tarragona Joan XXIII		
Terrasa	H.U. Mutua de Terrasa		

C.H.: Complejo Hospitalario (Hospital Complex); H.U.: Hospital Universitario (University Hospital); H.: Hospital; H.C.U.: Hospital Clínico Universitario; H.G.U.: Hospital General Universitario; C.H.U.: Complejo Hospitalario Universitario; C.A.U.: Complejo Asistencial Universitario.

Table 2. Training capacity in Digestive Ultrasound for resident physicians in the various Autonomous Communities, ranked by capacity (highest to lowest)

Autonomous community	Gastroenterology Departments with training capacity in Digestive Ultrasound for its Residents		Residents able to receive training in their own Gastroenterology Department	
	Number	Percentage	Number	Percentage
Región de Murcia	3/4	75%	4/5	80%
Comunidad de Madrid	10/14	71%	24/31	77%
Asturias	2/3	67%	4/5	80%
Castilla-La Mancha	3/6	50%	4/7	57%
Andalucía	8/16	50%	11/22	50%
Aragón	1/2	50%	2/4	50%
Extremadura	1/2	50%	1/2	50%
Castilla y León	2/6	33%	3/9	33%

Galicia	1/6	17%	1/7	14%
Canarias	0/4	0%	0/4	0%
Cantabria	0/1	0%	0/2	0%
Catalonia	0/11	0%	0/22	0%
Comunidad Valenciana	0/8	0%	0/13	0%
Balearic Islands	0/2	0%	0/2	0%
La Rioja	0/1	0%	0/1	0%
Navarre	0/2	0%	0/4	0%
Basque Country	0/5	0%	0/10	0%

Table 3. Syllabus of the theoretical modules (basic and advanced) of the Digestive Ultrasound course

Basic level
<p>1- General</p> <ul style="list-style-type: none"> Basic principles of B-mode ultrasound Basic principles of Doppler ultrasound Basic principles and applications of elastography <p>2- Ultrasound abdominal scan technique and normal ultrasound anatomy, types of transducers and ultrasound semiology</p> <p>3- Ultrasound and normal elastography report</p> <p>4- Liver ultrasound</p> <ul style="list-style-type: none"> Non-cirrhotic diffuse hepatic pathology. Diagnosis and new techniques applied to ultrasound (CAP and elastography) Liver cirrhosis and portal hypertension: diagnosis and follow-up

Liver biopsy

5- Liver focal lesions

Benign focal pathology, solid and liquid

Malignant pathology: primary and secondary tumors in non-cirrhotic liver

Focal lesions in cirrhosis: diagnosis and ultrasound follow-up

6- Ultrasonography of the bile duct and gallbladder

Pathology of the bile duct and vesicle

7- Ultrasound of the Pancreas

Inflammatory pathology of the pancreas

Solid pancreatic tumors

Cystic pancreatic tumors

8- Kidney and urologic ultrasound

9- Ultrasound of the spleen, retroperitoneum and adrenal glands

10- Ultrasound of the abdominal wall and peritoneum

11- Ultrasound of the digestive tract

12- Ultrasound of vascular pathology

Advanced level

1- General

Fundamentals of ultrasound - guided therapeutic interventions

2- Ultrasound of the liver

Doppler ultrasound in PHT. DPPI and surgical shunts

Elastography: diagnosis of cirrhotic and non-cirrhotic PHT

3- Liver focal lesions

FNA of focal ultrasound-guided hepatic lesions

Percutaneous treatment of focal liver lesions

Percutaneous treatment of liver collections

4- Ultrasonography of the bile duct and vesicle

Percutaneous ultrasound-guided cholecystostomy

5- Ultrasound of the Pancreas

Drainage of pancreatic collections

6- Ultrasound of Liver Transplant

Ultrasound in the post-liver transplant

Ultrasound diagnosis of complications after liver transplantation

Recurrence of the underlying liver disease and the rejection of the graft, either acute or chronic

FIGURE LEGENDS

Fig. 1. *Types of Department of Gastroenterology according to their training capacity in Digestive Ultrasound and the location of the training of their resident physician (MIR) in Gastroenterology.* Type 1A: train their own and external residents; Type 1B: train their own residents; Type 2A: residents are trained in external Department of Gastroenterology; Type 2B: residents are trained in a department of Radiology; Type 3: residents do not receive any training in Digestive Ultrasound.

Fig. 2. *Groups of Residents in Gastroenterology according to the place where they received training in Digestive Ultrasound.* Group 1A: residents receiving training at their own Department, which is type 1A; Group 1B: residents receiving training at their own Department, which is type 1B; Group 2A: residents receiving training outside their own Department, in Type 2A services; Group 2B: residents receiving training outside their own Department, in Radiology or type 2B services; Group 3: residents not receiving any DU training.

Fig. 3. *Regional distribution (by Autonomous Communities) of the percentage of Departments of Gastroenterology with training programs for residents in Gastroenterology and their capacity to train them in Digestive Ultrasound.*

Fig. 1.

Fig. 2.

Accepted Article

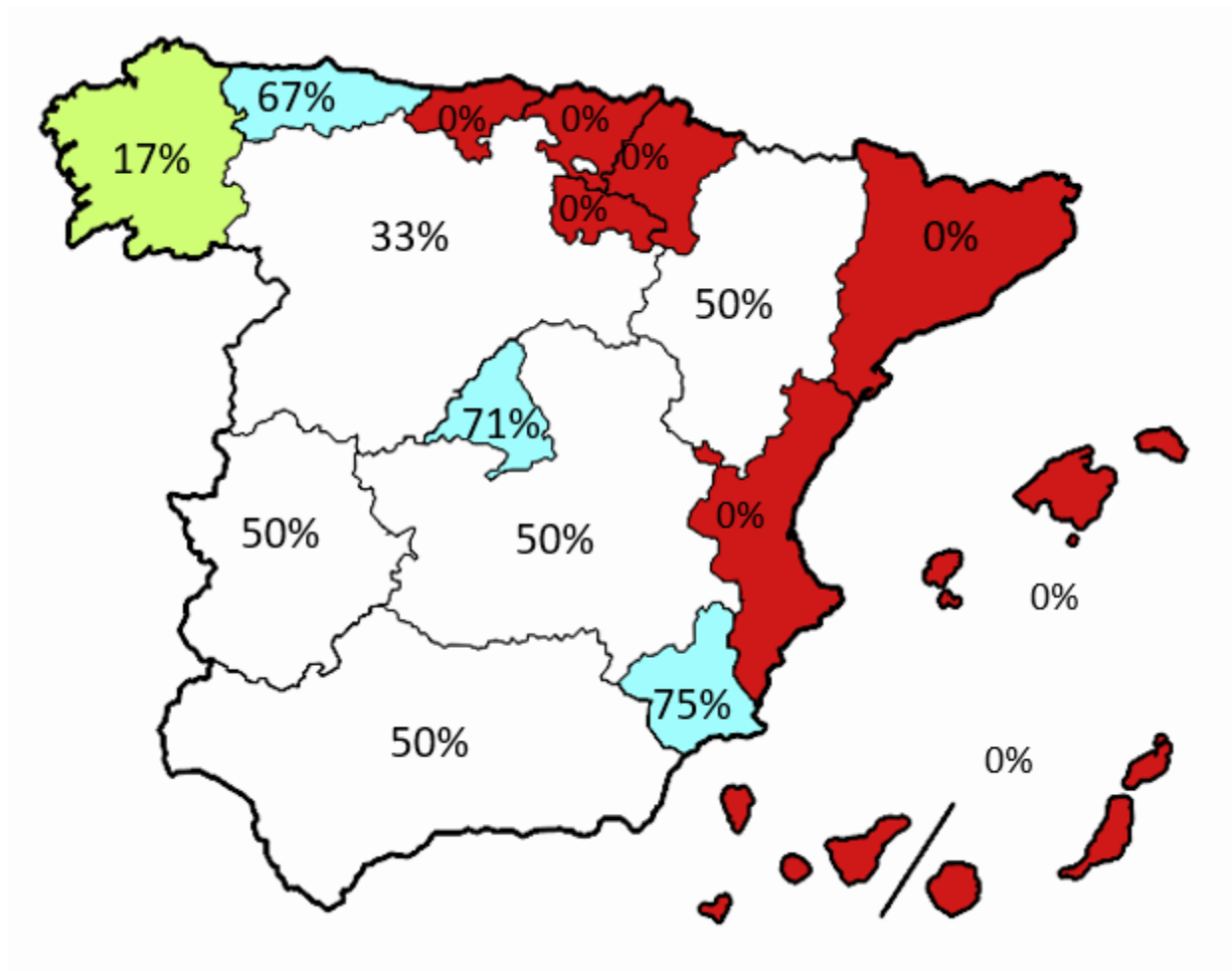


Fig. 3.

ACCEPTED