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Association of training standards in pediatric gastroenterology, hepatology and nutrition in European training centers with formal national recognition of the subspecialty: a survey of the ESPGHAN National Societies Network 2016-2019

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Abstract

Background This survey evaluated the effects of the recognition of pediatric gastroenterology, hepatology and nutrition (PGHN) on European PGHN training centers.

Method Standardized questionnaires were collected from training centers via the presidents/representatives of the National Societies Network of the European Society for Pediatric Gastroenterology, Hepatology and Nutrition, from June 2016 to December 2019.

Results A total of 100 training centers from 19 countries participated in the survey: 55 from 12 countries where PGHN is formally recognized (Group 1) and 45 from 7 countries where it is not (Group 2). Training centers in Group 2 were less likely to have an integrated endoscopy suite, a written training curriculum and a training lead (P=0.059, P<0.001 and P=0.012, respectively). Trainees in Group 2 were less likely to be exposed to an adequate number of diagnostic endoscopies, while no differences were found in relation to liver biopsies. Half of the training centers in both Groups do not have dedicated beds for PGHN patients, while in 64% and 58%, respectively, trainees do not participate in on-call programs for PGHN emergencies. Research training is mandatory in 26% of the centers. The duration of training, as well as the assessment and accreditation policies, vary between countries.

Conclusions This study has revealed significant discrepancies and gaps in infrastructure and training programs, training leadership, and assessment of training and certification across European training centers in PGHN. Strategies to support the recognition of PGHN and to standardize and improve training conditions should be developed and implemented.

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Keywords Training in pediatric gastroenterology, hepatology and nutrition, ESPGHAN

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Introduction

Pediatric gastroenterology, hepatology and nutrition (PGHN) has been established as an important pediatric subspecialty, contributing to the health care of children over the past 4 decades [1]. A pediatric specialist in PGHN is expected to be a capable expert in diagnosing, managing and treating digestive health conditions. The availability of a structured training plan under the supervision of experienced and dedicated tutors is of key importance in helping trainees obtain appropriate and essential clinical, technical, as well as personal interaction and communication knowledge and skills [2-6].

The adequacy of staff, infrastructure and equipment within a PGHN department is important for providing quality training and contributes to good patient care. Criteria for excellence of a medical service in PGHN have been established in the United Kingdom by the Royal College of Pediatrics and Child Health (RCPCH) [7] (Table 1). The European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) developed several editions of European Training Requirements in PGHN that have been formally adopted by the European Academy of Pediatrics (EAP) and the Union of European Medical Specialists (UEMS) and can serve to support formal national recognition of PGHN training in European Union member and associated countries, societies and governmental bodies, and to establish high-quality training programs and levels of certification [5,6]. PGHN has also been recognized as a pediatric subspecialty by many national bodies, including the UK General Medical Council, the German Bundesaerztekammer and the American Board of Pediatrics, requiring successful completion of set periods (usually 2-3 years) in a recognized training fellowship as well as successful completion of a sub-board examination for certification [3,4].

We evaluated the provision of training programs, infrastructure, medical and paramedical staff and the patient and procedural volumes of PGHN training centers across Europe, as well as look at the potential effects of the

Table 1 Criteria for excellence of a medical service in Pediatric Gastroenterology, Hepatology and Nutrition, according to the Royal College of Pediatrics and Child Health [7]

- Appropriate skilled and staffed services provided in inpatient and outpatient settings
- Clear governance and accountability requiring collaborative quality assurance framework
- Clear and accountable pathways of children emergency care with shared and agreed protocols and standards
- Maintenance of the critical interdependencies of services
- Linked IT services to support audit activities and data analysis
- Monitored performance to reduce variation in care and improve safety
- Regular meetings to ensure services are planned, commissioned and shared appropriately
- Specialist advice available 24/7 through telephone and/or on-call rotation
- An identified network lead with dedicated time within their job plan to ensure clear and effective communication across the network
- Opportunities for research, training and shared learning that enhances the skills and practical development of the workforce

status of formal national recognition of PGHN as a pediatric subspecialty.

Materials and methods

Standardized questionnaires [8] collecting data on infrastructure, staff, patient and procedural volumes, as well as organization of training in PGHN, were created by AP, AB and CRC on behalf of the ESPGHAN National Societies Network and were sent to the presidents or representatives of ESPGHAN National Societies, who were asked to forward these to the heads of PGHN training centers in their countries and collect the responses. In countries where no representative of the National Society participated in the survey, volunteers (AG for Italy and RF for Switzerland) were asked to distribute and collect the questionnaires, or (Portugal) data were obtained by the study coordinator directly contacting training centers. The project was approved by the ESPGHAN Council in 2016 and supported by the ESPGHAN. It was carried out from June 1, 2016, to December 31, 2019. The data and manuscript were reviewed and commented on by invited experts in endoscopy (MT), motility (MB and NT), hepatology (DK), and clinical nutrition (BK).

Statistical analysis

Descriptive analysis was performed for all variables. Categorical data were expressed as absolute numbers and proportions (%). Continuous variables were reported as mean ± standard deviation (SD)/range in the case of normal distribution or median and interquartile range (IQR)/range in the case of non-normal distribution. Continuous data were tested for normality using statistical tests (Kolmogorov-Smirnoff test) and graphical methods (histogram, Q-Q plot). For categorical data, the χ^2, or Fisher's exact test, where data were not suitable for χ^2 testing, were used. Correlations among continuous variables were analyzed using Spearman's or Pearson's test based on the variables' distribution. All statistical analyses were performed using the statistical package PSAW Statistics 21 (SPSS, Inc., Chicago, IL, USA).

Results

We approached 188 training centers, of which 100 provided an informative response [8]; 55 responses came from 12 countries where PGHN is formally recognized as a subspecialty (Group 1: Austria, Bulgaria, Czech Republic, Croatia, Hungary, Israel, Germany, Lithuania, Portugal, Switzerland, Turkey, United Kingdom), and 45 responses from 7 countries where it is not (Group 2: Belgium, France, Greece, Italy, Slovenia, The Netherlands, Spain). In The Netherlands the subspecialty is not formally recognized by the State, although a Committee on Subspecialist training has been established within the Dutch Pediatric Society that certifies competence of trainees in PGHN at the end of their fellowship.

Duration of training, assessment and accreditation

The minimum required duration of training varied between countries (Table 2), ranging from 12-18 months of full-time training in Lithuania and Germany, respectively, to 36 months in Austria, Portugal, Switzerland, Turkey and the United Kingdom. Certification of training also varied, with a requirement to complete formal examinations at the end of training in the majority of countries (9 of 12) (Table 2).

The availability of a structured training curriculum and of a clinical lead to supervise the training program is considered important for achieving learning objectives and clinical competence. However, 40% of training centers in Group 2 reported the absence of a specified curriculum and 29% lacked a clinical lead to supervise training (Table 3).

Upper cutoff age of patients followed by centers and patient volumes

The upper cutoff age of patients followed by the centers is shown in Fig. 1. Seventeen percent of centers in Group 1 and 11% of centers in Group 2 treat children and adolescents up to 16 years of age. The vast majority of centers in both groups (83% and 89%, respectively) however, treat children and adolescents up to the age of 18 years and some of them up to the age of 21 years (Fig. 1).

The size of training centers did not differ significantly between the 2 groups. The annual numbers of outpatients and in-patients were comparable in the 2 groups, with the majority of centers caring for 1501-3000 outpatients and 500-1500 inpatients per year (Fig. 2).

Infrastructure and staff

The availability of dedicated outpatient clinics for inflammatory bowel diseases (IBD), cystic fibrosis, clinical nutrition, hepatology +/- liver transplantation, as well as neurogastroenterology and motility, varied amongst training centers (Table 3), with the lowest numbers reporting dedicated clinics for liver transplantation and for neurogastroenterology and motility (Table 3). Access to endoscopy training was reported by the majority of training centers in both groups but the availability of an integrated endoscopy unit was reported by more centers in Group 1 than in Group 2 (P=0.059; Table 3). The median (range) number of full-time specialists in the training centers is 3 (0-17) and of part-time specialists 1 (0-7). Interestingly, in countries where PGHN is formally recognized, the median (range) of full-time specialists is 3 (1-13) and of part-time 1 (0-7), while in those where it is not, the respective values are 4 (0-17) and 1 (0-4), respectively (P=0.036 and

Table 2 Countries with and without official recognition of PGHN as subspecialty

Countries where PGHN is formally recognized (duration of training in months)	Duration of training in General Pediatrics (in years)	Certification of training after formal exams at the end of training	Certification of training after global assessment of portfolio	Countries where PGHN is not officially recognized (duration of training in Pediatrics in years)
Austria (36)	Austria (6)	Czech Republic	Austria	Belgium (4)
Bulgaria (24)	Bulgaria (4)	Croatia	Bulgaria	France (4)
Czech Republic (12)	Czech Republic (4)	Germany		Greece (5)
Croatia (24)	Croatia (4)	Hungary		Italy (5)
Hungary (24)	Hungary (5)	Israel		The Netherlands (5)
Israel (30)	Israel (4.5)	Lithuania		Slovenia (5)
Germany (18)	Germany (5)	Portugal		Spain (4)
Lithuania (12)	Lithuania (4)	Switzerland		
Portugal (36)	Portugal (5)	Turkey		
Switzerland (36)	Switzerland (5)	United Kingdom (plus certification on endoscopy)		
Turkey (36)	Turkey (4)			
United Kingdom (36)	United Kingdom (5)			

PGHN, Pediatric Gastroenterology, Hepatology and Nutrition

Table 3 Infrastructure, staffing and training in PGHN in countries where PGHN is officially recognized as a subspecialty (Group 1), compared to countries where it is not (Group 2)

Availability of	Group 1 (n=55)	Group 2 (n=45)	P-value
Dedicated clinics on inflammatory bowel diseases	28/48 (58%)	24/45 (53%)	0.627
Dedicated clinics on cystic fibrosis	30/51 (59%)	35/44 (80%)	0.030
Dedicated clinics on nutrition	30/53 (95%)	32/41 (78%)	0.029
Dedicated clinics on neurogastroenterology and motility	9/10(90%)	13/15 (87%)	>0.99
Dedicated clinics on hepatology +/- liver transplantation	35/50 (70%)	33/41 (80%)	0.252
Dedicated clinics on liver transplantation	6/48 (13%)	3/36 (8%)	0.726
Free access to endoscopic procedures	46/51 (90%)	36/44 (82%)	0.236
Endoscopy suit attached to training center	35/48 (73%)	22/41 (54%)	0.059
Dedicated gastroenterology beds	25/54 (46%)	22/41 (54%)	0.477
Home tube feeding program	48/51 (94%)	42/44 (95%)	>0.99
Home parenteral nutrition program	43/54 (80%)	32/43 (74%)	0.543
Specialized nurses attached to the training center	41/54 (76%)	32/46 (70%)	0.475
Dietitians attached to the training center	42/51 (82%)	30/44 (68%)	0.108
Pharmacists attached to the training center	24/48 (50%)	17/44 (39%)	0.273
Administrative personnel attached to the training center	28/43 (65%)	30/43 (70%)	0.645
Official on-call rotation program for gastrointestinal emergencies	26/51 (51%)	24/42 (57%)	0.553
Official on-call rotation program with trainees' participation	19/53 (36%)	18/43 (42%)	0.547
Training in research as "highly recommended"	22/44 (50%)	20/37 (54%)	0.716
Training in research as "mandatory"	12/50 (24%)	12/43 (28%)	0.668
Training curriculum	49/53 (92%)	27/45 (60%)	<0.001
Clinical leads for supervising the training programs	50/55 (91%)	30/42 (71%)	0.012

Numerators show the positive responses and denominators the total responses

PGHN, Pediatric Gastroenterology, Hepatology and Nutrition

P=0.953, respectively). The median (range) of the number of trainees is 2 (0-10) in centers of Group 1 and 2 (0-6) in centers of Group 2 (P=0.141), while the ratio of trainees to trainers is similar in both groups: median (IQR) ratio 0.5 (0.3-1.0) vs. 0.5 (0.3-1.0), respectively (P=0.519).

Participation of PGHN trainees in on-call programs to cover gastrointestinal (GI) emergencies

Although participation of trainees in on-call programs to cover and train in GI emergencies and admissions is recommended

by the ESPGHAN European Training Requirements (ETR) [6], 49% and 43% of training centers of Group 1 and 2 respectively, reported a lack of formal on-call rotation programs to cover GI emergencies, while more than half reported that their trainees did not participate in them (Table 3).

Procedural volumes

The median (range) numbers of procedures to which PGHN trainees were exposed per year (the annual number of procedures performed at the training center divided by the number of trainees in post) in the whole cohort, are shown in Table 4.

GI endoscopies

The median numbers of diagnostic (upper and lower) GI endoscopies per trainee per year were greater in centers of Group 1 compared to those of Group 2 (P=0.028 for upper endoscopies and P=0.05 for lower endoscopies). Low (≤50) numbers of diagnostic GI endoscopies per trainee per year were reported by more centers in Group 2 compared to Group 1: ≤50 upper endoscopies per trainee per year were reported by 1/51 (2%) of centers in Group 1 vs. 4/33 (12%) of those in Group 2 (P=0.075), while ≤50 lower endoscopies per trainee per year were reported by 21/51 (41%) vs. 24/33 (63%) of centers, respectively (P=0.005). With regard to therapeutic endoscopies, ≤20 procedures per trainee per year were reported by 28/49 (57%) of centers in Group 1 vs. 19/35 (54%) of those in Group 2 (P=0.795), while (≤5) per trainee per year were reported by 4/49 (8%) vs. 3/35 (9%) respectively (P>0.99). The numbers of wireless capsule endoscopies were low in both groups, as ≤5 wireless capsule endoscopies per trainee per year were reported by 36/45 (80%) of centers in Group 1 vs. 21/31 (68%) of those in Group 2 (P=0.225).

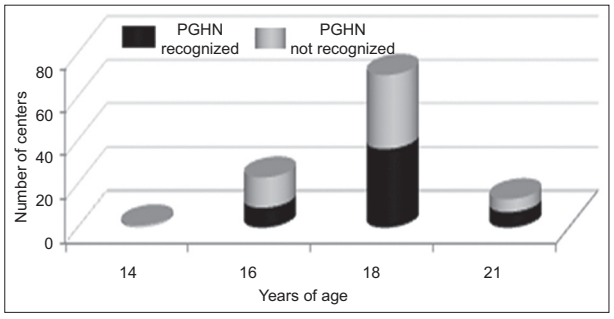

Figure 1 Age cutoff of the patients followed-up by the training centers in Pediatric Gastroenterology, Hepatology and Nutrition (PGHN) in countries where PGHN is formally recognized as a subspecialty and in those where it is not

Liver biopsies

No differences were found between Groups with regards to the exposure of PGHN trainees to liver biopsies. We should note however that a very low (≤5) number of liver biopsies per trainee per year was reported by significant numbers of centers in both Groups: 21/47 (45%) of centers in Group 1 and 14/29 (48%) of centers in Group 2 (P=0.760).

GI motility studies

No differences were found between Groups with regard to the exposure of PGHN trainees to GI motility studies, with the

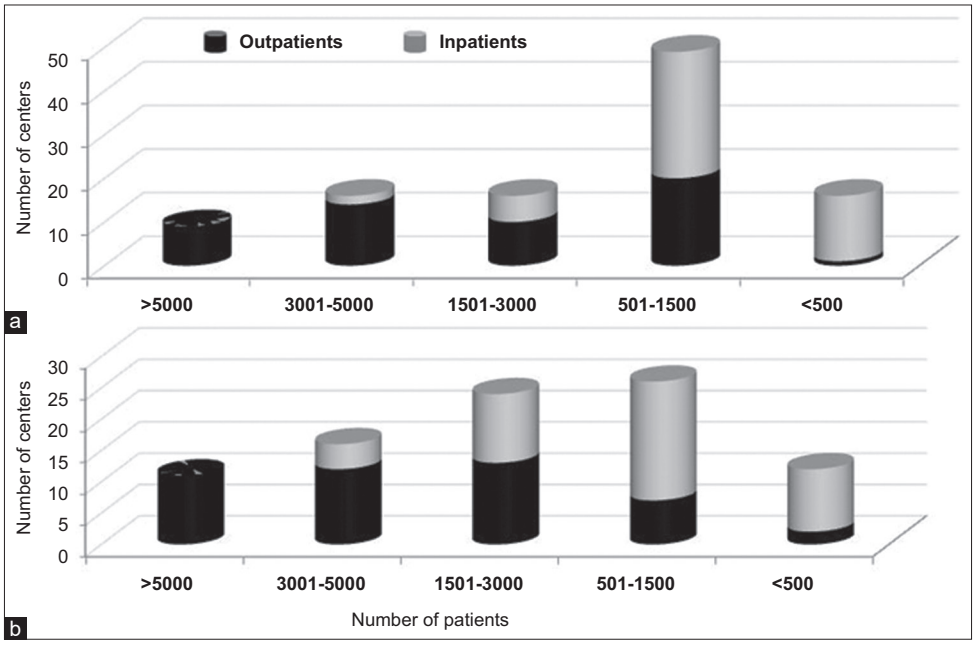

Figure 2 Annual numbers of patients in training centers in Pediatric Gastroenterology, Hepatology and Nutrition (PGHN) across Europe: (a) PGHN training centers in countries where PGHN is officially recognized; (b) PGHN training centers in countries where PGHN is not officially recognized

Table 4 Median (range) annual number* of GI procedures per trainee in the total cohort of PGHN training centers across Europe

GI procedures	Countries where PGHN is recognized (n=55)	Countries where PGHN is not recognized (n=45)	P-value
Upper endoscopies	200 (33-600)	112 (33-750)	0.028
Lower endoscopies	60 (0-350)	38 (7-250)	0.052
Therapeutic endoscopies	18 (0-120)	20 (3-325)	0.920
Capsule endoscopies	2 (0-30)	4 (0-30)	0.335
Liver biopsies	8 (0-60)	6 (0-125)	0.220
pH monitoring	9 (0-100)	17 (0-500)	0.079
pH/impedance	10 (0-131)	10 (0-125)	0.861
Standard manometry	0 (0-150)	5 (0-100)	0.001
High-resolution manometry	0 (0-75)	0 (0-40)	0.368

*Annual number of procedures performed at the training center divided by the number of trainees in post

GI, gastrointestinal; PGHN, Pediatric Gastroenterology, Hepatology and Nutrition

exception of standard manometries, where the total number per trainee per year was higher in Group 2, but still quite low (median: 5). We should note, however, that low (≤5) numbers of GI motility studies per trainee per year were reported by significant numbers of centers (including centers reporting zero numbers of tests), in both Groups: ≤5 pH/impedance studies were reported by 20/42 (48%) of centers in Group 1 vs. 15/39 (38%) of those in Group 2 (P=0.406); ≤5 standard manometries were reported by 35/42 (83%) of centers in Group 1 vs. 17/28 (61%) of those in Group 2 (P=0.034); ≤5 high resolution manometries were reported by 39/45 (87%) of centers in Group 1 vs. 21/27 (78%) of those in Group 2 (P=0.327).

Participation of trainees in research

Only half of the training centers in both groups reported the participation of trainees in research, while less than one third of centers in both Groups reported the participation as "'mandatory" (Table 3).

Discussion

This survey was the first collaborative work of the ESPGHAN National Societies Network reporting on infrastructure, staff, training programs, and patients and procedural volumes of European training centers in PGHN. PGHN has been recognized as a pediatric subspecialty in 12 of the 19 European countries surveyed; however, the duration of training and methods of accreditation vary. Training centers in countries where the PGHN subspecialty is not formally recognized are less likely to have an endoscopy unit attached to the training center, a specified training curriculum and dedicated training leads, and they are less likely to offer satisfactory exposure of trainees to diagnostic endoscopy procedures to obtain the necessary skills. It should be noted, however, that several of the above centers with long-term experience and adequate staffing, infrastructure, numbers of patients and procedures provide a high level of training, despite the fact that they have been established in countries where PGHN is not yet formally recognized as a subspecialty.

Our survey shows that only 54% of the training centers of the total cohort participate in formal on-call programs to cover GI emergencies, with even less (39%) involving trainees, despite the recommendation in the adopted ETR for PGHN training to expose trainees to GI emergencies [6], likely to occur outside working hours. The UK's RCPCH calculated the numbers of full-time equivalent consultants to provide consultant cover for emergencies as about 3.4 full-time equivalent consultants per center. Additional resources are required for weekend review and on-call out of hours [9]. Our survey, however, showed that 30% of centers in the total cohort had <3 full-time consultants, which are inadequate numbers to fulfill the requirements for complete coverage of emergencies.

Our survey showed that dedicated outpatient clinics for IBD, hepatology, nutrition, and neurogastroenterology and motility are lacking in significant numbers of centers of both Groups. The active involvement, however, of trainees in PGHN in the management of patients with IBD, chronic liver diseases, intestinal failure and GI motility disorders is important for acquiring knowledge and skills in these diseases, which are core competencies for pediatric gastroenterologists, and this will be facilitated if dedicated outpatient clinics are available. In the UK, the Pediatric Guidance Checklist for Gastroenterology and Hepatology [10], reviewed by the PGHN College Specialty Advisory Committee (CSAC), mandates that trainees in PGHN should be exposed to a minimum of 50 cases of IBD per year (25 new cases and 25 follow-up cases) and should be involved in their management as well as in their transitional care, participating actively in at least 2 transition clinics per year. With regard to clinical nutrition training, CSAC mandates that each trainee should be exposed to at least 10 children with intestinal failure per year (of which 5 are new cases), while a PGHN training center should include a minimum of one whole time equivalent (wte) nurse specialist, one wte pediatric dietitian and a minimum of 0.5 wte pharmacist with experience in prescribing parenteral nutrition [10]. Our

survey, however, showed that 50% of centers in countries where the subspecialty is recognized, and 61% of those in counties where it is still not, lack a pharmacist attached to the training center, while 18% and 32%, respectively, lack a dietitian attached to the training center. Both ESPGHAN [5,6] and the North American for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) have highlighted the importance of an educational framework on clinical nutrition in PGHN fellowships [3,4]. In 2019, ESPGHAN published an updated curriculum in which the knowledge and skills in clinical nutrition that need to be obtained during PGHN training were described [6]. NASPGHAN's guidelines suggest a minimum of one year of advanced training at an academic center under the supervision of a full-time faculty in nutrition, and participation in basic or clinical research in nutrition [3].

Our survey showed that 24% of centers in countries where the subspecialty is recognized and 30% of those in counties where it is still not, lack specialized nurses, while 35% and 30%, respectively, lack administrative personnel. It should be noted, however, that the availability of specialist nurses to deliver specialist care of chronic GI diseases and to compensate for shortfalls in medical staff, including carrying out procedures such as breath tests, pH monitoring, pH/impedance, etc., offers added learning opportunities for trainees.

The exposure of the trainees to endoscopy varies considerably amongst training centers, and is woefully inadequate in many, which can lead to barriers in obtaining adequate experience. For endoscopies, the "'competence threshold" endoscopy numbers recommended by ESPGHAN [5], NASPGHAN [4] and the American Society for Gastrointestinal Endoscopy for adult specialists [11] ranges from 100-130 [11] upper endoscopies and from 50 [5] to 275 [11] ileo-colonoscopies. Although the minimum numbers are achieved in many PGHN training centers in Europe, the estimation that trainees perform only ~30% of the endoscopies performed at a training center, reported recently in a survey published in abstract form [12], suggests that a considerable number of trainees may receive suboptimal procedural training. This shortfall could potentially be addressed by restructuring training programs, allowing trainees to rotate across different centers so that their training needs are more likely to be met.

With regard to liver biopsies, NASPGHAN suggested that at least 20 liver biopsies should be performed to obtain competence, half of them in infants and children <3 years of age [3]. ESPGHAN also proposed the same minimum number of 20 liver biopsies under supervision [13]. Our survey, however, showed that in 45% centers in countries where PGHN is formally recognized and in 48% in those where it is not, the exposure of each trainee to liver biopsies is too low (≤5 annual numbers of liver biopsies per trainee) and inadequate for obtaining the appropriate experience and skills, unless the trainees rotate to centers with larger procedural volumes or extend the duration of their training.

With regard to GI motility training, the shortfall is apparent in our study, which showed that only 66 centers (44 in Group 1 and 32 in Group 2) reported the availability of pH/impedance, which is the most basic motility testing, with even fewer (n=33) training centers (18 in Group 1 and 15 in Group 2), reporting the availability of high-resolution manometry. The limited number of centers providing dedicated training in neurogastroenterology and motility is a global problem. Only 38 motility centers and 54 neurogastroenterologists were available throughout North America in 2015 [14]. Similar results were reported regarding adult gastroenterology training programs, as only 12% of fellowship programs offer comprehensive motility training [15]. In another study carried out in 2018 in the USA, more than 75% of trainees in PGHN reported that had not been adequately trained in GI motility studies and procedures during their fellowship [16].

Our survey showed that, in countries where PGHN is not formally recognized, 40% of the training centers lack specified training curricula and 29% lack dedicated clinical training leads, both of which appear as a major limitation for providing adequate training. Furthermore, our survey showed that almost half of the training centers in PGHN did not include training in research, despite widespread recognition of research as a desirable core element in subspecialty training.

This study had a number of limitations, such as the cross-sectional study design, the dependency on volunteers willing to self-report the requested information, and the variability in response rates. In some countries, all PGHN training centers provided a response (Austria, Bulgaria, Croatia, Greece, Hungary, Israel, Slovenia), while in others, such as Germany and Turkey, only some of the training centers participated in the survey. Notwithstanding the above limitations, the strength of this survey is that it provides the largest dataset on the infrastructure, staff, patients and procedural volumes in PGHN across Europe, revealing wide variations in training opportunities across Europe.

In conclusion, this study documented considerable variation and shortfalls in PGHN training across Europe with respect to the duration of training, the evaluation and accreditation policies, as well as training program concepts and content, staffing and supervision of training. PGHN societies should support quality improvement in PGHN training programs, based on the adopted PGHN ETR, and develop agreed European strategies for accreditation of training centers and for establishing a European board examination in PGHN, which could contribute to improving standards of training. Strategies to support the recognition of PGHN and standardization and improvement in training conditions should be developed and implemented.

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Summary Box

What is already known:

- The provision of adequate and appropriate staff (trained and skilled medical and paramedical staff) as well as infrastructure and equipment within a subspecialty training unit support the training of competent subspecialists in pediatric gastroenterology, hepatology and nutrition (PGHN) and a high level of patient care
- A structured training plan for trainees and supportive supervision by experienced tutors have a major impact on the achievement of learning objectives and the acquisition of the required clinical knowledge and skills for the subspecialty

What the new findings are:

- PGHN is officially recognized as a subspecialty in only 12 of the 19 European countries that participated in the survey
- The duration of training and approaches to assessment and accreditation vary widely
- In the countries where PGHN is not officially recognized as a pediatric subspecialty, 40% of centers lack a training curriculum and 29% lack a training lead

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