



EDUCATION

Reflections on Child Orthopaedic Surgery in Spain

Luces y sombras de la Cirugía Ortopédica Infantil en España

T. Epeldegui

Servicio de Cirugía Ortopédica Infantil, Hospital Universitario del Niño Jesús, Madrid, Spain

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“Orthopaedics, or the art of correcting and preventing deformities in children.” “As in the title, I have composed the name from two Greek words.

Ortos, which means free of deformity, and Paidos, a child. Using these two words, I have composed the word Orthopaedia to express in a single word the objective I am proposing, which is to teach the different methods of preventing and correcting deformities in children.”

Nicolas Andry (Paris, 1741)

Introduction

Paediatric Orthopaedics is often a poorly understood area within the specialty. It encompasses the study and treatment of numerous pathologies from birth to skeletal maturity.

It covers all the congenital abnormalities (malformations and deformities); neurological disorders, from peripheral neuropathies to central disorders (ICP) and spinal problems (spina bifida); as well as other disorders of embryological development (arthrogryposis, multiple syndromes). It takes in the broad sector of the dysplasias and dystrophies.

It also takes in the growth impairments in deformities and angular or rotational deviations of the limbs and spine, as well as in the musculo-skeletal tumours that are more common in patients under 20 years of age.

Another important type of pathology relates to infections (arthritis and osteomyelitis) that, on occasion, may require differential diagnosis from certain tumours.

Finally, we must consider the whole traumatology sector (accidental and sports injuries, child abuse, and the like), with the immature skeleton's idiosyncrasies and the potential impact on growth.

It is primarily this breadth in the spectrum of pathology that distinguishes paediatric orthopaedics from the other subspecialties (hand, spine, foot, knee, hip) that have fostered the creation of specific scientific societies and lines of research differentiated from the specialty as a whole but related to anatomical regions or particular joints.

Thus, paediatric orthopaedics is a subspecialty encompassing all pathologies of the locomotor system and having the peculiarity of being applicable during the growth and development period.

This represents a further complexity, requiring that the course of disease processes be studied so that therapies may be prescribed taking the future and the growth process into account. This is the key difference from the treatment of adult patients.

The remarks we will make present 3 different approaches:

- The first refers to the knowledge of paediatric orthopaedic surgery required, in terms of both the general education of an Orthopaedics and Trauma Residency and the complementary knowledge and surgical practice necessary to develop a specialisation in this area.
- The second section pertains to the organisation of patient care for this subspecialty and the problems seen in patient care services, both from an organisational standpoint and in terms of patient care options and challenges at the national or regional level.

E-mail: epeldegui@gmail.com

- The third section includes some recommendations for improving education and patient care.

Education in paediatric orthopaedics

We got a somewhat deceptive impression from a Service where, over the years, we have seen about 400 doctors from Spain rotate through during their Residency program.

The lack of knowledge about paediatric pathology results from a lack of training both at university and on the surgical services of different hospitals.

There are various reasons for this. Overseeing or consultant organisations in both the government (Ministry, Autonomous Communities) and the scientific societies or the university itself are made up of those who specialize in adults and do not take into consideration the importance or the scope of this area within the specialty. Not one single subdivision of the specialty's own national commission is involved in paediatric pathology, and it has a great deal of difficulty advising in this area.

“You cannot love what you do not know”

We have 2 official stipulations that regulate medical residents' training in Spain.^{1,2}

According to the general education requirements listed for specializing in Orthopaedic Surgery and Traumatology (Resident Physician), “In Spain, knowledge of paediatric orthopaedic pathology is not mandatory.”

The Ministry Order,¹ which defines the training program, sets forth the following particularities:

in the section on planning for the training period, it states, “the need to reduce non-specialty rotations in favour of training in the specialty...”

Specific rotations are considered priority and include Anaesthesiology and Resuscitation, Angiology and Vascular Surgery, Plastic and Aesthetic Surgery.

Elective rotations: General and Gastrointestinal Surgery, Oral and Maxillofacial Surgery, Thoracic Surgery, Physical Medicine and Rehabilitation, Neurosurgery, Neurology, and Rheumatology.

In the schedule section, it describes:

During the period from third to fifth year, include a minimum of 2 and a maximum of 3 electives (2 months each).

However, below this it states, “Experience shows that there are many requests for orthopaedic rotations in paediatric, hand, spine...”

It more fully describes 3 levels of training:

Level A: acquisition of the ability to work autonomously and independently.

Level B: possession of good knowledge and participatory personal experience.

Level C: possession of theoretical knowledge or as an observer.

Then, in elaborating upon this knowledge at these 3 levels, it lists trauma and paediatric orthopaedic pathology

under the cursory description of pathologies that are good to know to a greater or lesser degree.

In summary, reading this Ministry order was disconcerting to us because of the contradictions it contains: limiting training in Paediatric Orthopaedics (it is not listed among the specialty electives) but recognizing the demand for this training.

There is opportunity, however, to do a “volunteer” rotation on Paediatric Orthopaedic Units for a maximum of 4 months, if proposed by the mentor or the teaching commission.²

Is it, perhaps, a whim of the physician in Residency training? Or his/ her mentors?

Paediatric Orthopaedic Surgery is not an officially recognised subspecialty in Spain. However, the Royal Decree² that defines the instructional units states: “Incorporating standards of compulsoriness into specialty training in health sciences could open the way for creation of compulsory instructional units and, in turn, an expansion of the specialties for which training is offered in the instructional units listed in the foregoing sections.”

Subordinate to the *Ministerio de Sanidad* [Ministry of Health], the *Comisión Nacional de la Especialidad* [National Commission for Specialties], under this same compulsoriness standard, would have the authority to define the Specialised Training Area for Paediatric Orthopaedic Surgery, establishing a system for complementary training in the subspecialties under the concept of a Fellowship, similar to the way this is handled in other countries.

Despite the fact that the subspecialty is not recognised, however, and that there is no mandatory basic training or any accredited system for acquiring training in this specific area, Paediatric Orthopaedic Surgery Services and Sections do exist throughout Spain.

International recruiting takes place among specialists from different western countries, in connection with both the training of young orthopaedists and the staffing of Paediatric Orthopaedic Surgery Units or Services. These Units do exist in the different countries, but there is no uniformity in either the staffing or training of the specialised personnel who should hold positions in Paediatric Orthopaedics in hospitals. However, there is a clear difference in specialisation and training between paediatric diseases and adult diseases from both an organisational and a patient care standpoint.

Through personal contacts, we were able to gather information from an array of countries with outstanding members of the *Sociedad Europea de Cirugía Ortopédica Pediátrica*.

The information gathered is summarised in the table below (table 1).

In summary, the most important points are:

1. The compulsoriness of acquiring knowledge over a 6-month training period (expandable according to countries).
2. Complementary training of 12-24 months to complete specific training in cases where the objective is specialisation in the paediatric area, both in countries that recognize this subspecialty and in those that do not recognize it officially.

Table 1 Responses to the questionnaire on training in various countries

Country	Residency period	Length of rotation	Official Recog.	Procedure for acquiring training	Time	Subsequent exam	Separate from adults
Lebanon	Yes	6 m	Yes	Training in international institution	2 yr	No	No (specialised staff)
Greece	Yes	12 m	No	Training in institution	2 yr		No (specialised staff)
United Kingdom	Yes	6 m	Yes	<i>British Society for Children's Orthopaedic Surgery</i>		No	No (specialised staff)
Denmark	Yes	1 m	No	Training in institution	3 yr		Yes
Norway	Yes		No				No (specialised staff)
Finland	No		No				No (staffing not clear)
United Kingdom	Yes	6 m	Yes	Training in institution	1 yr	No	No (personal específico)
France	Yes	6 m	No	Training in institution	2 yr	Yes	Yes
Austria	Yes	3 m	No				Yes
Taiwan	Yes	Unspecified	Yes	Training in institution	1 yr	No	No (personal específico)
Croatia	Yes	6 m	Yes	Training in institution	2 yr	Yes	No (personal específico)
Belgium	Yes	4-6 m	No	Training in institution			No (personal específico)
Egypt	No		No	No		No	No
Turkey	Yes	3 m	No	No		No	No
Israel	Yes	3 m	No				Yes
USA	Yes	6 m	Yes	Training in institution	1 yr	No	No (personal específico)
Poland	Yes	10 m	No	Not possible			Yes
Bulgaria	Yes	3 m	Yes		3 m	Yes	Yes
Germany	Yes	12-18 m	Yes	Training in institution	18 m	Yes	No (personal específico)
Switzerland	Yes	6 m	No	Training in institution	2-3 yr	No	Yes
Portugal	Yes	6 m	No				Yes
Sweden	Yes	3-6 m	No				Yes

- Only 6 countries officially recognize the subspecialty, but all of those countries require 12-24 months of complementary training to accredit the training as sufficient for a particular specialisation. In any case, the training takes place on specialised Paediatric Orthopaedic Surgery services.
- Paediatric Orthopaedic Surgery services/ units may be independent or may be part of a general Trauma and Orthopaedic Surgery service; in all but 2 cases, however, they are distinguished by having staff who are specialised in the treatment of children, which is different from that of adults.
- There may or may not be an examination or a certification of knowledge updating, depending on the country.

In Spain, we used another questionnaire with the information below for services or units differentiated for the treatment of paediatric diseases. Table 2 reflects the information gathered in Spain.

These data supply information for the services or units named in the first column only (responses were not obtained from all Centres), so while they are of value for the survey, they do not represent all such services/ units throughout the country.

Although there has been a steady increase in the number of Residents completing complementary training in Paediatric Orthopaedics, the estimated figure inferred from the table, based on those who replied to us, enables us to calculate that about 30% of Residents in the specialty do

Table 2 Responses to the questionnaire on paediatric orthopaedics training in Spain

	Staffing	Total residents / year	Length of rotation	Other rotations	Future interest
Zaragoza	3	7	6-8 m	2-6 m	
Barcelona SJD	16	46		3-6 m	Yes?
Sevilla	6	8	4-2 m		1/ 10
Coruña	3	6-10	2-6 m		No
Valencia	5	4-7	4 m	2-3 m	
Madrid GM	9	12-14	4 m	3 m	1/ 10
Pamplona	4	4	2-3 m		1/ 10
Madrid NJ	10	35		4-6 m	1/ 10
Madrid LP	5	12		4-6 m	No
Mallorca	7	3-4	6 m	4 m	

not acquire this training—a perception corroborated by heads of services elsewhere in Spain.

The second noteworthy observation is that there is discrimination between some doctors and other doctors on the basis of their origin.

Doctors who must travel to services in other locations frequently have a limited rotation period and, consequently, a precariousness in their knowledge.

It does not make sense that, during a training period, opportunities to increase knowledge would be limited because of the originating hospital's on-call schedule or its need to have collaborators for surgical programs conveniently available.

The most convincing evidence of the lack of knowledge among our Resident colleagues comes to light in those who voluntarily submit to an examination upon completing their Residency. Typically, the 2 areas in which knowledge is most precarious are the Basic Sciences and Paediatric Orthopaedics—all the more so when we consider that these new specialists submitting to this voluntary examination upon completing their Residency should be adequately prepared to pass it.

This new information leads us to think it is absolutely essential that the procedures and length of training for this specialty be modified.

At Madrid's *Hospital Niño Jesús*, certifications of work performed during the rotation period have been established that specify the case preparations, sessions, seminars, surgeries, etc., in which Residents participated or advanced during the rotation. This certification must be considered for inclusion in the Resident's book that is mentioned in the Royal Decree where it is stipulated.²

However, it would be desirable to increase the information on the rotation period with another evaluation of the service chosen for the rotation.

At *Hospital Niño Jesús*, we instituted the survey model below, which enables us to modify and/or improve educational programs for the rotation and provides us with information as to the degree of satisfaction with the rotation and whether it meets expectations (table 3).

Organisation of patient care in paediatric Orthopaedic Surgery

The organisation of patient care in Paediatric Orthopaedics in Spain suffers from similar disparities.

There is a specified number of patient care units or services for Paediatric Orthopaedics. They are located in

Table 3 Evaluation questionnaire for residency rotation in Trauma and Orthopaedic Surgery

Resident's name:	
Rotation period:	
Questionnaire	Points (*)
The welcome received on the Unit	
Activities you engaged in on the Unit were planned in advance by the Unit	
The activity was performed with a mentor	
The practicum was of adequate duration	
Your expectations were met	
The experience acquired will be useful to you in your work	
The overall evaluation the rotation conducted on this Unit deserves	
Would you recommend this rotation to your colleagues?	
You would be interested in specializing in Paediatric Orthopaedics in the future	
Describe any aspects of the rotation that you think could be improved:	

*Evaluation: from 1 to 10.

tertiary hospitals, whether general or dedicated (only 2 of the latter in Spain), within the public healthcare system.

There are also nationwide referral centres selected by the Ministry of Health for certain complex pathologies.

However, neither the competencies of each hospital nor the channels for transfer to other hospitals, depending on the type of orthopaedic pathology or trauma, are well defined.

This is a personal decision made by the doctor receiving a patient at a Primary Care Centre or on a General Trauma and Orthopaedic Service at a general hospital.

According to a study by the British Orthopaedic Society,³ only 14.3% of orthopaedic surgeons declare an interest in Paediatric Orthopaedics.

Another more precise study in the USA,⁴ establishes the following parameters:

- The density of orthopaedic surgeons is 6.1 per 100,000 inhabitants.
- Of these, only 3.7% have completed a Fellowship in Paediatric Orthopaedics.

Concern for the decline in Paediatric Orthopaedic Surgery specialists is apparent in this same publication. It also presents a survey of young orthopaedists, indicating the reasons why they tend to reject this subspecialty as an option for future specialisation, as transcribed below:

1. Treating children with disabilities (69%).
2. Great interest in another subspecialty (63%).
3. High percentage of non-surgical treatments (61%).
4. Having to interact with parents (55%).
5. Receiving low income (less surgery) (51%).
6. Medical-legal risks* (40%).
7. Few opportunities for private practice (36%).

*The period of demand for treatment in children may be up to 15 years because of the correlation with developmental ages.

Another reason may be the lack of industry support because this subspecialty's low consumption of implants means limited commercial interest.

All of this is even more weighty if we take into account that, in the United States, knowledge of paediatric pathology is mandatory as part of general training in Orthopaedics.

The problem in Spain could get worse if we do not take heed to other countries' observations regarding the demand for doctors who apply for specialisation in the paediatric area and the reasons why they are scarce.

We have no official figures available on the percentage of orthopaedic surgeons, general or paediatric—no data that could be superimposed upon the data reported in the above-mentioned publications—for this subspecialty is not even recognised in our legislation, as it is in the UK and the United States.

However, the estimated number of Orthopaedic Surgery and Traumatology specialists in Spain is believed to be about 7,000. The *Sociedad Española de Cirugía Ortopédica y Traumatología (SECOT)* has 4,500 members.

Census information⁵ establishes that we have 46,951,532 inhabitants, of which the population from 0 to 16 years of age is 7,792,281.

Analysis of this figure shows that 16.595% of the population falls into the paediatric age group.

If we determine the ratio per 100,000 inhabitants, we would arrive at 14.9 orthopaedic surgeons per 100,000 inhabitants—more than double the proportion in the United States (6.1)—but compared to the information gathered from paediatric services personnel in Spain, we would not come close to half the ratio cited in the foregoing articles.

From these data we can infer:

- Patients are not referred to specialised services in tertiary hospitals because, with this proportion of subspecialists, it would be impossible to care for the percentage of the population in need of care.
- If patients are treated by general specialists, the severity of the trauma and/or orthopaedic pathology would have to be discerned so as to determine whether their competence or professional training is sufficient or the patient should be referred to a Centre with specialised units to avoid iatrogenic lesions. We should not forget the medical-legal consequences that may arise from improper care.

Here, two problems start to come together:

One has to do with patient care (the population to be cared for), and the other has to do with training (the doctors specialised in Paediatric Orthopaedic Surgery).

This is without taking into consideration the age curve or the sex ratio.

It is known that the number of women studying surgery has increased and that there is more and more specialisation in Paediatric Orthopaedics. We also have data available showing that women, over the course of their working life, work fewer hours,⁴ but in the United States, 50% of medical students are women, and a portion of them choose Orthopaedic Surgery as a specialty.

According to another study, 5% of the women who specialize in Orthopaedic Surgery choose to specialize in Paediatric Orthopaedic Surgery.⁶

Another very important consideration from the standpoint of patient care is the consequences of a lack of preparation in Paediatric Orthopaedics for anaesthesiologists and orthopaedic surgery generalists. This is a point of reference in the United Kingdom³ where, according to a survey, 25% of heads of service do not take care of orthopaedic or paediatric problems, and 40% of heads of Anaesthesia do not take care of children.

We cannot compare this information to Spain because data is lacking, but this is how colleagues specialised in this pathology perceive it.

The concern in the paediatric world about the reduced number of paediatric specialists has encouraged study of various proposals,⁷ from considering collaboration with specially-trained nursing staff to suggesting paediatricians as Fellows for non-surgical treatments.

Another suggestion for attracting more doctors to this area within the specialty is the incentive of ever-increasing

financial offers, which may encourage dedication to the paediatric subspecialty.^{3,6,7}

Suggestions and recommendations

For the training period (residency)

- It is absolutely essential that training standards be unified and that compulsoriness of “rotation through specialised services over a 6-month period” be established, with no distinction between in-house and visiting Residents.
- The Paediatric Orthopaedics service/unit where the rotation takes place should furnish a “certification of clinical-patient care work” and of the instructional process during the rotation period. An evaluation by the Resident, similar to the one presented in this article, is equally desirable.
- It is crucial that the subspecialty be recognised through the development of compulsory units that the official stipulations permit.

“A specific training area for the subspecialty in Paediatric Orthopaedic Surgery must be recognised.”

Training requirements for the subspecialty must be established and, along with that, recognised specialists must be available for coverage and as replacements for job positions in the Paediatric Orthopaedics specialty in the future.

To obtain recognition as a paediatric orthopaedic surgeon, specifically, “a complementary training period of 12-24 months must be established” on a Paediatric Orthopaedic Surgery service.

In the future, knowledge updating requirements must be regulated through a system such as those already in place in the developed world.⁸⁻¹⁰

For the organisation of patient care

Regulate patient care in paediatric musculo-skeletal diseases using lesion-specific criteria:

- Establish treatment for simple processes in Primary Care Centres or local and regional hospitals by providing channels for the transfer of patients to specialised services at tertiary hospitals, thereby circumventing the primary care physician’s discretionality in both orthopaedic and trauma procedures.
- It is essential that new paediatric orthopaedic services be developed based on studies of the incidence of lesions in children. A formula similar to the one in the British Society’s morbidity study³ could be considered, with any corrections that may be necessary for the Spanish population (paediatric population 16.5% Spanish vs 20% British).
- Finally, when a family or a physician has doubts, we must make it easy for them to obtain a second opinion by “overcoming the barriers between Autonomous Communities” that currently exist in many regions of Spain due to different administrative systems, bearing in

mind the medical-legal consequences of a case not being properly treated.

- Health department officials must regulate what may be or should be done in each Centre, depending on its classification as primary, secondary, or tertiary. Centres should be equipped with the resources necessary to care for the pathologies that fall within their designated patient care level, avoiding the cost overrun resulting from staffing, on the one hand, and inadequately trained professionals, on the other hand, with the attendant risk of medical-legal claims. “It is not realistic that all Centres should take care of any and all pathologies.”

Evidence level

Evidence level V.

Protection of human and animal subjects

The authors declare that no experiments were performed on humans or animals for this investigation.

Confidentiality of data

The authors declare that no patient data appears in this article.

Right to privacy and informed consent

The authors declare that no patient data appears in this article.

Conflict of interest

The authors declare no conflict of interest.

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