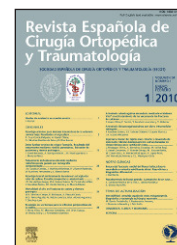


# Revista Española de Cirugía Ortopédica y Traumatología

www.elsevier.es/rot



## EDUCATION

### Orthopaedic Surgery and Traumatology in the medical degree

D. Hernández Vaquero<sup>a,b</sup>

<sup>a</sup>*Servicio de Cirugía Ortopédica y Traumatología, Hospital Universitario San Agustín, Avilés, Spain*

<sup>b</sup>*Facultad de Medicina de Oviedo, Oviedo, Asturias, Spain*

Received December 15, 2010; accepted December 23, 2010

#### Access to University

The recent publication of a list of the best universities in the world has revealed that there is not a single Spanish university among the first 200, and only 10 among the first 500. Of the first 20 in the list, 17 are in North America, 2 are in England and 1 is in Japan. The first in the 500 ranking is the USA with 154 institutions, followed by Germany with 39 universities, Great Britain with 38 and Japan with 25. The latter two are ahead of France, which (with 22 institutions) fell from the 5th to the 6th position, tied with Italy and China.

It is possible that many of our readers would not have been able to study for a medical degree back in our time, due to the very high score needed to be admitted to Spanish institutions. Medical students are still the best in relation to their secondary school qualifications and medicine is still the most sought-after degree among new university students; it has almost become an elitist career. According to data obtained from medical schools, 44,539 students chose one of the 6,229 positions offered as their first choice

this year. With the new scoring system of the University Access Test, which has a maximum score of 14, the average this year was around 12.13. The medical faculties that required the highest score were Santander (12.59), Oviedo (12.57), Salamanca (12.56), Granada (12.50) and Badajoz (12.45), with figures that are almost impossible to meet.

We could thus sum up, in accordance with what has been indicated thus far, that medical degrees are chosen by the best Spanish students, but these degrees do not offer them a quality education, even when it is accepted that the scales used to evaluate and grade the quality of universities can be questionable. To complicate matters even further, our medical students enrol in private academies as soon as their studies are finished (or even before) to prepare for the exam that will let them enter postgraduate education. Consequently, graduate studies become a mere formality necessary to qualify for the MIR (Spanish residency exam). It is not uncommon to see students in their last year in the libraries at their university hospitals studying for this exam instead of attending practical lessons. It is possible that the changes announced for the MIR system will modify and improve this short-term vision of preparing for a purely theoretical exam, exempt from any clinical practice. Medicine is more than just

E-mail: dhernandezv@meditex.es

scientific knowledge; it also includes other aspects like communicating with patients and family members, or the cost-efficiency relationship of our actions, which are not included in this exam. Furthermore, with the current modifications, the academic record holds little importance in the final MIR grade (10%) and the title of Doctor, the highest academic level any university can give, has become undervalued.

## OST in Medical Schools

Orthopaedic Surgery and Traumatology (OST) was a compulsory core subject in the Musculoskeletal Diseases class, along with Rheumatology, before the changes introduced by the Bologna reform. Rheumatology programs address systemic musculoskeletal diseases, while our specialty studies medical and surgical treatment of osteoarticular, congenital, acquired and traumatic processes. It could be said that the academic load for rheumatology generally represents one third of this subject, while the other two thirds are the responsibility of orthopaedic surgeons, although this varies depending on the faculty. It is normally studied during one semester in the fifth year.

The credits assigned to the Musculoskeletal Diseases subject vary greatly from one university to another, as each of them decides on the academic load and this has a direct relation with the representation and power of the commissions formed at each university. As in almost all clinical disciplines, the total teaching hours for theoretical classes have been sharply reduced, with a range oscillating from 20 hours at the Universidad de Cadiz to 67 at the Universidad de Alcalá de Henares, according to the guides published on their websites. The traditional syllabus has been reduced, but not its contents, which means that there are artificial syllabi including ample topics impossible to develop with the adequate depth for a medical student. The consequence is that many of the hours dedicated to seminars are in fact composed of theoretical contents. Many of these universities have shown important errors in their curricula. The hope is that they will now be corrected by the new curriculum oriented towards the Bologna reform, which will be discussed further.

According to an updated record of public universities published in the report by Professor Gomar some years ago for the Spanish Traumatology and Orthopaedic Surgery Society (SECOT) yearbook, there were 51 OST professors, out of which 10 were full university professors, one was a full trade school university professor and the other 40 were tenured professors. Although an updated record is not currently available, the number of full professors must be lower while the number of tenured professors must be roughly similar.

All universities include practical classes in their curricula, with special emphasis on emergency service rotations. The total number of hours is considered adequate within the set of surgical practices and their specialties, with a range of

**Table 1** Wait-listed patients per 1,000 inhabitants

<i>Patients wait-listed for urgent surgery per 1,000 inhabitants</i>	9.11
For General Surgery and Digestive Apparatus interventions	1.79
For Gynaecology interventions	0.51
For Ophthalmology interventions	1.74
For ENT interventions	0.72
For Traumatology interventions	2.30
For Urology interventions	0.68
For Heart Surgery interventions	0.05
For Angiology and Vascular Surgery interventions	0.26
<i>Patients wait-listed for specialist consultation per 1,000 inhabitants</i>	40.24
For Gynaecology	3.94
For Ophthalmology consultation	7.64
For Traumatology consultation	6.33
For Dermatology consultation	4.59
For ENT consultation	2.24
For General Surgery consultation	1.60
For Urology consultation	1.95
For Digestive Apparatus consultation	2.22
For Cardiology consultation	1.71

Taken from key indicators of the National Health System.

40-70 hours. In most universities, practical classes are carried out simultaneously with theoretical classes, but some of them have a final practical course with rotations throughout the different surgical and medical specialties. The students usually stay in our specialty for 3 or 4 weeks, fully integrated in all activities of our Service throughout that time. In these cases, practical sessions are reduced to 20-30 hours during the theory teaching period. In the case of the Facultad de Oviedo (Oviedo Faculty of Medicine), practices are taught in 2 cycles; there is one at the beginning of the course, aimed at learning to explore the musculoskeletal system, and another one that lasts the duration of the course, when students have already passed the theory period and are then focused on therapeutic techniques.

It seems that our specialty does not have the attention it deserves in medical study programs. Musculoskeletal processes are frequent among the general population, especially in an increasingly aging population. Almost 30% of all primary care consultations are related to the musculoskeletal system and the demand for specialised consultations is much higher than in any other specialty (table 1), reaching 6.33 per 1,000 population (second only to Ophthalmology). This could be due to the lack of training that Primary Care doctors have in Orthopaedic Surgery and Traumatology and could be directly related to the limited educational load in our specialty in medical degree studies (now associate degree studies) and the likewise limited rotation through our units of physicians being trained in

Primary Care. Table 1 also shows the number of patients awaiting surgical intervention by our specialty, which is the highest in all surgical disciplines; the size of the wait list is conditioned on one hand by hospital resources and on the other hand by the increasingly frequent surgical indication for orthopaedic and traumatology processes. However, it is not only the OST that is badly positioned in the area of healthcare; until very recently, it had no specific area in the university, depending on the faculty and the surgery curricula. There are still some universities in our country where OST studies depend completely on associate professors linked to the Surgery Department, without tenured OST professors.

## Study plans

In recent years, there has been an attempt to modify the study programs and contents of some courses, to update educational methods and to modernise health science teaching. The results have been irregular; some changes have collided head-on into the scarceness of resources and –why not admit it- with class-interests and partisan views. It is no easy task to properly prepare professionals who will have to respond to the requirements of future medicine and who will have to confront the multiple functions required in the practice of medicine, at a level of excellence, within a national public health system. We must admit that universities are more oriented towards disciplines than towards missions, and it seems likely that the tendency towards expansion, fragmentation and specialisation of knowledge will reinforce this orientation even more in future. However, the concept of University, in much the same manner as Justice, is an institution that although fragile, comes from the community's wish to have an objective and absolute system of reference, independent of transitory tendencies and influences. It is from those concepts that academic liberty and independence have sprung. It is also from here that the concept of service arises, understood as the commitment on behalf of the university with the community that it serves. Undergraduate medical training must strive to ensure that students not only accumulate theoretical knowledge, but clinical experience and sufficient preparation. The objectives of undergraduate medical training have been modified in recent years. The Global Federation of Medical Education, a Consultant Committee of the European Union, has recently insisted that there is a need for different states to organise their efforts to establish new objectives in the environment of undergraduate medical training. These would be:

- To train efficient physicians in the care, preventive and general health domains.
- To adapt the content of educational programs to the needs and social changes of health matters.
- To integrate theoretical knowledge and practical or clinical training using the resolution of specific problems as the basic building block of learning.

- To establish some form or mechanism of interconnection and continuity between the objectives and the educational programs of undergraduate training, postgraduate training and continuous training.

These objectives have historically been centred on the idea that medical training should be based on the most solid scientific foundation possible, that medical faculty professors should have a strong commitment towards investigation and that the learning process (or clinical practice) of students should be guaranteed through the contact with patients in university hospitals. With this idea in mind, clinical practice was usually reduced to very large university hospitals where students would walk around with no clear purpose through different super-specialised medical services such as Neurosurgery or Cardiac Surgery. Their sole goal would be to see strange things, complex techniques and, basically, anecdotal occurrences with no relation to their future practice. Most importantly of all, this would take place without a learning program that was even remotely related to their reality.

## Towards other teaching methods

Against this traditional educational scheme consisting of scientific information alongside teaching beds in university hospitals, there is now evidence that the correct method of learning is based on knowing how to solve clinical problems, known as teaching by cases. It is basically a matter of reducing the amount of time the professor is in an active position and leaving that time to the students, of making them reason things through, giving them the tools needed to discuss solutions and find the optimal one; the students are given practice in selecting the best diagnostic and therapeutic measures for patients, for society and for the sustainability of the national health system. Teaching by objectives organises the learning plan by paying attention to the most common clinical problems. For example, what to do against pain in the hip region of a child, the attitude towards a fractured hip in an octogenarian, pain and numbness in the knee of an adolescent patient, and so forth. This teaching scheme must improve the training that students currently receive, which as we all know is mediocre. A recent study carried out in the Hospital Clínico de Barcelona has shown that, before starting in the hospital, less than a third of MIR residents had placed a cast, inserted a urinary catheter or a peripheral or central line, or performed a gas analysis, paracentesis, lumbar puncture or thoracentesis. Only one in five MIR residents knew how to fill out a death certificate.

Transforming this traditional teaching method towards a new model requires the following:

- Having more professors, including young and enthusiastic staff, directly related to Primary Care. The average age of tenured professors in our area is possibly around 60, with no substitute personnel available. It is necessary to

modernise the concept of “linkage” that some professors are now suffering and which dates back to obsolete regulations, with duplicate dependencies and the overall sensation that we do not belong to any job structure, either in the healthcare or in the university environment.

- Introducing the teaching and healthcare professions as a real career path for professional promotion. Research must have specific weight in teacher accreditation, but it cannot be the focus of accreditation as it is now.
- Centring the clinical practices in health centres and hospitals in the area, including local hospitals, thus making use of all the national health system and its staff.
- Students must forget how they studied in high school and learn the parameters for scientific discussion. They must expand their view (not just passing a course) and be able to consult bibliography, face a diagnostic or therapeutic problem, and so on.
- Providing technological innovations in teaching methods.

## The “Bologna Reform” in Medicine

In 1999, 29 European countries including Spain gathered in Bologna to start a comprehensive reform of educational systems in the old continent. The countries participating in what was called the “Bologna Declaration” agreed to commence a series of legislative changes that would lead to a harmonisation of higher education in Europe, allowing universities to adapt to a new model; this model improved their competitiveness and made mobility throughout Europe simpler for university students, through equivalent titles in all European countries.

This reform is based on three main aspects: facilitating student and worker mobility, structuring curricula into three levels: degree, master and doctorate and quantifying them through the so-called “European higher education credits”. These European credits (European Credit Transfer System or ECTS) are the measurement unit reflecting the results of studying and the total volume of work done by the student to reach the objectives established in the study plan, giving a quantifiable value to any student’s motivation and effort to learn. Each credit amounts to 25 work-hours and no course can surpass 60 credits. In medicine, in-person/ not in-person percentages must meet the following ratio: preclinical subjects must be 40% / 60% and clinical subjects, 60% / 40%.

Graduate degrees will replace diplomas and normal degrees, lasting 4 years with a workload of 240 ECTS. The Medical Degree will last 6 years with 360 credits, as it is subject to a specific European directive. Architecture, Pharmacy and Veterinary Medicine have also been left out of the 4-year plan and will last 5 years with 300 credits. The second level of training will be Masters Courses lasting 1-2 years, with 60-120 European credits. The third level, once the master has been passed, is the degree of Doctor

which will become a requirement to become a University professor. The educational program of doctorates will have the goal of providing the student with an advanced training in research techniques. It will have two periods: a training period (research master) and a research period (Doctoral thesis). Medical degrees will make direct access to a Doctorate possible without the need for a professional master, as they will last 6 years, although this compensation had not been announced officially when this report was written.

Bologna responds to the current situation of a more globalised world, it homogenises all European titles, focuses teaching on the more practical aspects of learning, involves the students more as it forces them to obtain a series of specific competences related to knowledge of what will one day be their career and it will make incorporation into the job market easier.

From the beginning, it has been a controversial topic. On the one hand, it is a directive imposed by the EU on its members that will facilitate the mobility of students and workers. On the other hand, some consider this reform to be a defeat of the Napoleonic concept of university, headed by France, and a victory of the Anglo-Saxon concept. It is argued that knowledge will be reduced in the new curricula, but also that students will be more connected to the job market and that study plans will be directed towards the specific aspects that society needs.

The medical degree is now controlled by a disposition published in the BOE (official state bulletin), from which the following information was extracted: a total of 37 competences are defined, grouped into 6 environments: a) professional values, attitudes and ethical behaviour; b) scientific foundations of medicine; c) clinical abilities; d) communication abilities; e) public healthcare and systems; and f) information management, critical analysis and investigation.

These competences, that is, what a doctor must know, are:

### Professional values

1. Recognise the essential elements of the medical profession, including ethics, legal responsibilities and professional, patient-centred practice.
2. Understand the importance of these principles for the benefit of patients, society and the profession, with special attention to professional secrecy.
3. Learn to apply the principle of social justice in professional practice and understand the ethical implications of health in a changing global context.
4. Develop professional practice regarding patient autonomy, beliefs and culture.
5. Recognise one’s own limitations and the need to maintain and upgrade professional skills, with special emphasis on autonomous learning of new knowledge and skills as well as motivation for quality.
6. Professional growth with respect to other health professionals, acquiring teamwork skills.

### Scientific foundations of medicine

7. Understand and recognise the normal structure and function of the human body at molecular, cellular, tissue, organic and systemic levels, at different stages of life and in both genders.
8. Recognise the basics of normal human behaviour and its disorders.
9. Understand and appreciate the effects, mechanisms and manifestations of disease on the structure and function of the human body.
10. Understand and recognise the causative agents and risk factors that determine health status and development of disease.
11. Understand and appreciate the effects of growth, development and aging on individuals and their social environments.
12. Understand the fundamentals of action, indications and efficacy of therapeutic interventions based on available scientific evidence.

### Clinical abilities

13. Obtain and prepare a medical record that contains all relevant information.
14. Perform physical examination and mental assessment.
15. Ability to develop an initial tentative diagnosis and to establish a rational diagnostic strategy.
16. Recognise and handle situations that are life-threatening and those requiring immediate attention.
17. Establish a diagnosis, prognosis and treatment, applying the principles based on the best information possible and clinical safety.
18. Indicate the most appropriate treatment for the most common acute and chronic diseases in patients, as well as the terminally ill.
19. Pose and propose preventative measures appropriate to each clinical situation.
20. Acquire adequate clinical experience in hospitals, health centres and other health institutions under supervision, as well as basic knowledge of patient-centred clinical management and proper use of tests, drugs and other healthcare system resources.

### Communicational abilities

21. Listen carefully, obtain and synthesise relevant information about the problems afflicting the patient and understand the contents of this information.
22. Write clinical histories and other medical records in a way understandable to others.
23. Communicate effectively and clearly, both orally and in writing with patients, family members, media and other professionals.
24. Establish good interpersonal communication enabling efficiency and empathy with patients, relatives, media and other professionals.

### Public health and health systems

25. Recognise the determinants of population health, both genetic and those dependent on gender, lifestyle, demographic, environmental, social, economic, psychological and cultural factors.
26. Assume a role in actions for the prevention of and protection from diseases, injuries or accidents, health maintenance and promotion at both individual and community level.
27. Recognise one's role in multidisciplinary teams, assuming leadership when appropriate, both for the supply of healthcare and in interventions for health promotion.
28. Obtain and use epidemiological data to assess trends and risks of health-related decision-making.
29. Understand national and international health organisations and the environments and conditions of the different health systems.
30. Have basic knowledge of the NHS and health legislation.

### Information management

31. Understand, critically evaluate and learn to use sources of clinical and biomedical information to obtain, organise, interpret and communicate scientific and healthcare information.
32. Know how to use information technology and communication in clinical activities, treatment, prevention and research.
33. Hold and use patient information records for later analysis, preserving the confidentiality of data.

### Critical analysis and research

34. Have, in all professional activity, a critical, creative, constructive and sceptical point of view, oriented towards research.
35. Understand the importance and limitations of scientific thought in the study, prevention and management of disease.
36. Be able to formulate hypotheses, collect and critically evaluate information for problem-solving using the scientific method.
37. Acquire basic training for research activities.

The most important parts of the European Higher Education Area (EHEA) are the modifications to the educational model, which have been the most controversial aspect. The EHEA strives for a more Anglo-Saxon model, with the idea of reducing the theoretical load, defining curricula in relation with specific competences and explicit interest in generic competences that will allow lifelong learning. This will mean a switch towards models that are closer to active methods than those based on lectures, to independent student work and to the development of generic competences.

**Table 2** Motor apparatus pathology in medical degrees in Oviedo University**Types of lessons***In person*

Lectures: 26.6%

Seminars: 8.8%

*Practical Lessons*

Clinical Practice: 18%

Group Tutorials: 5.3%

*Evaluation Sessions: 1.3%***Working Hours***In-person teaching hours: 135**Non-personal working hours: 90**Total Lesson Hours: 225***Exposition Subjects***Traumatology and Orthopaedic Surgery: 39**Rheumatology: 18**Rehabilitation and physical therapy of the motor apparatus: 3*

In these new study plans, in accordance with EHEA, Spanish universities have made or are making a great effort to adapt to the establishments of the Bologna Declaration. The recently adopted curricula of the Facultad de Oviedo defines “Blocks” with a specified number of ECTS credits: morphology, structure and functions of the human body (64 ECTS credits); social medicine, communication abilities and initiation to research (30 ECTS credits); clinical training (100 ECTS credits); diagnostic and therapeutic procedures (40 ECTS credits); supervised practical work and final year project (a minimum of 60 ECTS credits). Each academic course consists of 60 ECTS credits, which is equivalent to 1,500 hours of work per course. This total number of credits is divided into mandatory and optional, while the final year project receives 9 credits. The last course contains no theoretical classes, instead consisting of a sort of rotating course throughout different hospital services in healthcare centres and hospitals of the corresponding autonomous region. Consequently, the disciplines and academic load have been reduced to 5 courses instead of the former 6.

Motor Apparatus Pathology is set within specific competences and in Module 3, within the “Human Clinical Training”, with the objective of “Recognising, diagnosing and managing the main pathologies of the motor apparatus”. The number of assigned credits is 9, with the distribution indicated in table 2.

It is possible that many of our readers will consider 9 credits devoted to musculoskeletal system pathologies out of the total 360 to be too few, especially taking into account the relative weight of our specialty in Primary Care consultations and general hospital activity, as we have mentioned before. We have exactly the same opinion; however, there are other areas with even less weight in the

final grade, such as Ophthalmology with 5 credits, Otolaryngology with 7 or Obstetrics-Gynaecology with 6. Paediatrics, a subject considered to be very important and quite dense in the old curriculum has also been given 9 credits like ours.

The Bologna reform represents a change in the different aspects of undergraduate education. The fundamental activity of professors is now “teaching to learn”; that is, not only transmitting knowledge, but also how to organise tasks, seminars and continuous evaluations to stimulate student acquisition of knowledge, capacities and skills. The incorporation of ECTS credits does not mean an overload of work, but it should lead to a change in the attitude of the students: they are no longer mere receptors of knowledge (education-based teaching), but now have to adopt an active, independent attitude in relation with the planned activities they must carry out (learning-based teaching), more in accordance with the new tendencies that we described before.

The Bologna reform, to which all university studies will gradually adapt, has some other implications in our country and has caused various conflicts. Many consider the implementation deadline to have been too short, without having previously adapted the number and teaching preparation of professors and without any prior budgetary evaluation. In fact, complaints from professors and students are very common in universities where it has already been implemented, partly due to coinciding with difficult economic times. On the other hand, it could be that new medical graduates will have less specific knowledge and only “general views” of different areas, much in the same manner as other degrees. It also seems difficult to imagine students getting used to individual, and to a certain extent autonomous, work without the need to overcome purely memory-related tasks.

Nevertheless, the road to Bologna goes in only one direction and it must be considered as an opportunity for our universities to be better placed in the rankings mentioned at the beginning of this article and for our professionals to be better prepared for what society demands from them. Everything will depend on accompanying this with other necessary reforms and on society understanding that resources properly invested in training professionals will undoubtedly be beneficial for everyone.

**Recommended references**

1. Bañosa J, Boscha F. ¿Ha llegado, por fin, el lobo? La adaptación de los planes de estudio de medicina al Espacio Europeo de Educación Superior: consideraciones en torno a una Orden Ministerial. *Med Clin*. 2008;131:457–9.
2. Grado en Medicina. Universidad de Oviedo. Available from: [www.uniovi.es](http://www.uniovi.es).
3. Indicadores Clave del Sistema Nacional de Salud. Instituto de Información Sanitaria. Ministerio de Sanidad y Política Social, Madrid, 2010. Available from: <http://www.msps.es/estadEstudios>.
4. Llujià A, Costas L, Grau J, Trilla A. Conocimientos, capacidades e intereses de los médicos internos y residentes (MIR) al incorporarse al hospital. *Med Clíin*. 2009;133:107–11.

5. Ministerio de Educación y Ciencia. Orden ECI/332/2008, de 13 de febrero, por la que se establecen los requisitos para la verificación de los títulos universitarios oficiales que habiliten para el ejercicio de la profesión de Médico. BOE 15 Febrero 2008.
6. Gomar Sancho F. Anuario SECOT 2007-08. Enseñanza de Pregrado. Madrid: Editorial SECOT; 2007.
7. Ministerio de la Presidencia. Real Decreto 1892/2008, de 14 de noviembre, por el que se regulan las condiciones para el acceso a las enseñanzas universitarias oficiales de grado y los procedimientos de admisión a las universidades públicas españolas. BOE 24 Noviembre 2008.
8. Pedraza Muriel V. Formación médica y necesidades sociales. Med Clin. 2001;116:658–63.