



European Curriculum in Orthopaedics and Trauma

European Education Platform

The intention of this document is not to impose a European Curriculum but only to act as a guide for all Associations that want to implement a European Curriculum at the National Level.

Both UEMS and EFORT are aware that there is still a wide variation in Orthopaedics and Trauma Education in Europe and this document intends to help in harmonising the different process of Orthopaedic and Trauma Education in Europe. It is up to each National Association to adopt or adjust it to their National requirements.

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A combined project between EFORT and UEMS



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INTRODUCTION

We are all aware that due to the relaxation of border controls, labour movement across Europe has become more widespread. However, concerns have been raised about the standard of knowledge and professional competence of surgeons who have qualified in one country and move to practice in another. EFORT is conscious that even in the larger countries there can be considerable variation in training systems and assessments. Furthermore, the scope of the specialty is variable, with some countries separating orthopaedics and traumatology, and variable levels of training in non-operative and operative management

For this reason we believe it would be to the benefit of all the National Associations if we developed a document setting out what we consider to be the minimal requirements for training in orthopaedics and trauma across Europe. Based on this premise we think that one of the roles of EFORT is to build up a European Orthopaedic and Traumatology platform, which recognises the primacy of the National Associations and Regulatory Authorities. The goal is to develop a European Curriculum for Orthopaedics and Traumatology acceptable to all European Nations, which includes a unified process of assessment; and verification that acceptable standards of competence have been achieved. The intention of this curriculum is to enable nations to produce orthopaedic and trauma surgeons who are safe to screen the full range of referrals that can be made to the orthopaedic and/or trauma service, and to deal with the majority safely. They will be capable of recognizing more complex cases and their urgency, and of arranging appropriate and timely onward referral. With a modular approach it is possible to write a syllabus that encompasses the available training but allows constituent nations to identify the components that form part of their own programmes. It also enables the identification of differences in training when there is movement of the surgeon from one country to another.

We are aware that there is a wide variation in the way orthopaedic specialization is practiced in each European country, which makes this task a real challenge. We wish to preserve the particularities of each Association whilst developing the broad principles of the curriculum to allow general applicability. Minimal requirements for Orthopaedic Training have been agreed by the European Union of Medical Specialists (UEMS), but these have never been adopted in their entirety by National Regulatory Authorities. Recently, updating of the Professional Qualifications Directive of the European Commission has required Europe-wide agreement of Training Requirements in all professional bodies, including all medical specialties, and this has contributed to an increased interest in the harmonisation of training in orthopaedic surgery.

The European Board of Orthopaedics and Traumatology (EBOT), on behalf of the Orthopaedic Section of the UEMS has been running an annual examination, conducted in the English language, for the past twelve years. For the past two

years EFORT has become directly involved in this examination process by taking responsibility for much of the administration.

The EBOT exam is not mandatory, since all European residents can choose to take their national examination, managed by their own Association, in their local language, where such an examination exists. A final examination in the Specialty is not universal, and this in turn generates an increase in the variation in terms of assessment from one country to another. The EBOT exam tests the generality of orthopaedics and trauma but without a defined syllabus, which makes it difficult for examiners, training directors and participants to be clear about the requirements of the specialty, with only vague information about the steps necessary to become a competent Orthopaedic Surgeon, capable of safe independent practice. In terms of assessment, it also makes sense that residents throughout Europe should have the same kind of evaluation during, and at the end of training, which would be mandated by a European Curriculum.

In December 2012, EFORT launched **The European Education Platform – (EEP)**, by inviting the National Associations to contribute to this process. The idea was to start with a small group to establish a framework and later to involve all Associations, in order to have wide representation across the European Union. At the same time UEMS, EBOT, the Speciality Societies and a representative of FORTE, (the trainees association), were invited to participate in the process.

We knew that we would have an enormous task in front of us but we were committed to involve all stakeholders in the process of creating, in the near future, a European Curriculum which fulfils all of these needs. At a time when Orthopaedic Surgeons are in the limelight due to several political issues and when there are financial constraints in most health care systems in Europe, it is fundamental to improve our capacity and consistency in producing well trained, competent orthopaedic surgeons throughout Europe.

We would like to thank all those who participated in the elaboration and revision of this document for their extraordinary work; UEMS, FORTE, EEP group, and the following National Associations and Speciality Societies:

National Associations:

- | | |
|----------------|--|
| Austria | Austrian Society of Orthopaedics and Orthopaedical Surgery -
Österreichische Gesellschaft für Orthopädie und Orthopädische Chirurgie
(ÖGO) |
| Belgium | Belgian Association of Orthopaedics and Traumatology - Belgische
Vereniging voor Orthopedie en Traumatologie (BVOT) |
| Belgium | Belgian Royal Society of Orthopaedic Surgery and Traumatology - Société
Royale Belge de Chirurgie Orthopédique et de Traumatologie (SORBCOT) |

Croatia	Croatian Orthopaedic and Traumatology Association - Hrvatsko Udruzenje Ortopeda i Traumatologa (COTA/HUOT)
Croatia	Croatian Orthopaedic Society of the Croatian Medical Association (CrOS)
Cyprus	Cyprus Association of Orthopaedic Surgery and Traumatology (CAOST)
Denmark	Danish Orthopaedic Society - Dansk Ortopædisk Selskab (DOS)
Finland	Finnish Orthopaedic Association - Suomen Ortopediyhdistys (FOA)
France	French Society of Orthopaedic Surgery and Traumatology - Société Française de Chirurgie Orthopédique et Traumatologique (SOFOT)
Germany	Deutsche Gesellschaft für Orthopädie und Orthopädische Chirurgie (DGOOC)
Germany	Deutsche Gesellschaft für Unfallchirurgie DGU - German Society for Trauma Surgery (DGU)
Germany	Professional Association of Orthopaedic Surgeons - Berufsverband der Fachärzte für Orthopädie und Unfallchirurgie e. V. (BVOU)
Greece	Hellenic Association of Orthopaedic Surgery & Traumatology (HAOST)
Italy	Italian Society of Orthopaedics and Traumatology - Società Italiana di Ortopedia e Traumatologia (SIOT)
Kosovo*	Kosovo Society of Orthopaedics and Trauma Surgeons
Luxembourg	Luxembourgian Society of Orthopaedics and Traumatology - Société Luxembourgeoise d'Orthopédie et de Traumatologie (SLOT)
Malta	Association of Orthopaedic & Trauma Surgeons of Malta (AOTSM)
Netherlands	Netherlands Orthopaedic Association - Nederlandse Orthopaedische Vereniging (NOV)
Norway*	Norwegian Orthopaedic Association - Norsk Ortopedisk Forening (NOF)
Poland	Polish Society of Orthopaedic and Traumatology (PTOiTR)
Portugal	Portuguese Society of Orthopaedics and Traumatology - Sociedade Portuguesa de Ortopedia e Traumatologia (SPOT)
Romania	Romanian Society of Orthopaedics and Traumatology - Societatea Romane de Ortopedie Si Traumatologie (SOROT)
Serbia*	Serbian Orthopaedic Trauma Association (SOTA)
Slovenia	Slovenian Orthopaedic Society - ZdružEnje Ortopedov Slovenskega Zdravniškega Društva (SOA/ZOSZD)
Spain	Spanish Orthopaedic and Traumatology Society - Sociedad Española de Cirugía Ortopédica Y Traumatológica (SECOT)

Sweden	Swedish Orthopaedic Association - Svensk Ortopedisk Förening – (SOF)
Switzerland*	Swiss Society of Orthopaedic Surgery and Traumatology - Schweizerische Gesellschaft für Orthopädie und Traumatologie - Société Suisse D'Orthopédie et de Traumatologie (SGOT-SSOT)
Turkey*	Turkish Society of Orthopaedics and Traumatology - Türk Ortopedi Ve Travmatoloji Birliği Dernegi (TOTBID)
United Kingdom	British Orthopaedic Association (BOA)

*non European member states

European Speciality Societies

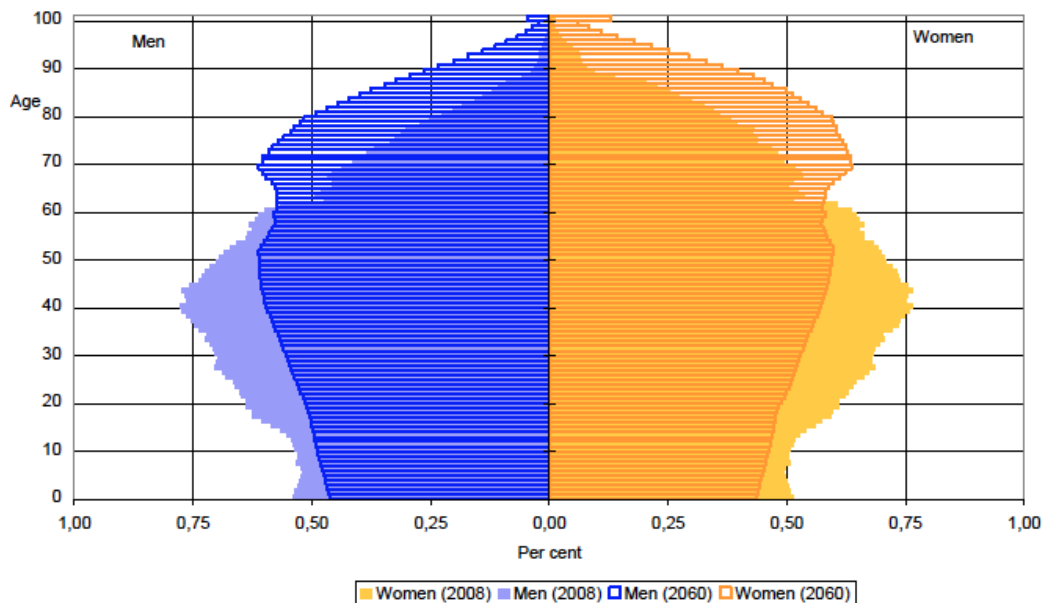
EBJIS	European Bone and Joint Infection Society
EFOST	European Federation of National Associations of Orthopaedic Sports Traumatology
EFAS	European Foot and Ankle Society
EHS	European Hip Society
EORS	European Orthopaedic Research Society
EPOS	European Paediatric Orthopaedic Society
ERASS	European Rheumatism and Arthritis Surgical Society
ESPA	European Society of Pelvis and Acetabulum
ESSKA	European Society of Sports Traumatology, Knee Surgery and Arthroscopy
EWAS	European Wrist Arthroscopy Society
FESSH	Federation of European Societies for Surgery of the Hand

BACKGROUND

In the recent past several documents have been approved by the European Commission, taking into consideration the ageing population and identifying the need to face this situation with an increased demand for the health care systems across Europe.

Between 2008 and 2060 the population of the EU-28 aged 65 and over is projected to increase by 66.9 million and the "very old" (80+) will be the fastest growing segment of the population¹, whilst the population of working age taxpayers will contract.

Graph 1 – Population projection 2008 – 2060



This will create an enormous challenge to the EU health care systems that have to perform a difficult balancing act, firstly between increasing demands on health services and restricted supply; secondly between the need to respond to people's health needs locally but also to be prepared for major public health crises. Four major issues will be faced, according to EU officials¹:

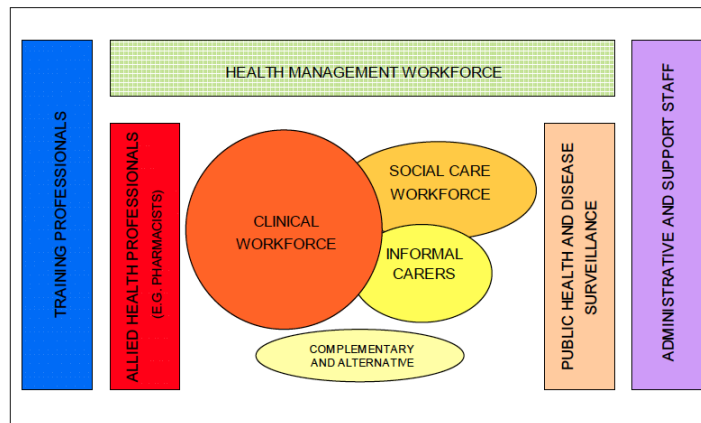
- An ageing population
- New technology, making it possible to increase the range and quality of healthcare in terms of diagnosis, prevention and treatment – but this has to be paid for and staff need to be trained to use it.
- New and re-emerging threats to health, for example from communicable diseases and antimicrobial resistance.
- Increasing spending on health due to the above generating further and major longer-term issues for the sustainability of health systems.

In a recent Editorial published in *The Bone and Joint Research*, Lars Lidgren et al ² called attention to this growing problem. Today, musculoskeletal disorders (MSDs) including those resulting from trauma, directly affect the mobility, autonomy and quality of life of more than 100 million Europeans. Mobility from cradle to grave reduces the risk of cardiovascular disease, diabetes and stroke. Through the 'Bone and Joint Decade' initiative, at the beginning of the millennium, the World Health Organization attributed the high burden of MSDs on societies and the individual to an increasingly ageing population:

- 40% of people over the age of 70 years suffer from osteoarthritis (OA) of the knee.
- 80% of people with OA have some limitation of movement, and 25% cannot perform routine daily activities.
- Road traffic injury is the leading cause of death for people between the ages of 15 and 29, with a huge variation in incidence between EU countries.
- In a review of 27 trauma studies, the median cost per patient for acute trauma treatment was USD \$22 448 (IQR: \$11 819 to \$33 701). The acute treatment cost of trauma was higher than for any other disease group.
- Patients, especially women, aged over 65 years consume a disproportionate share of hospital resources for trauma care: particularly with fragility fractures.
- Surveys in developed countries indicate that, by the age of 70 years, more than one in four women had sustained at least one fragility fracture and the estimated lifetime risk for wrist, hip and vertebral fractures was estimated to be 15%; very close to that of ischaemic heart disease.

In order to respond to these challenges, health care systems all over Europe have to be effective and efficient, supported by the best professionals. This is why EDUCATION becomes an even more important part of the process. According to the GREEN PAPER from the European Workforce for Health³, training professionals is an important step in this process. It is also very important to remember that harmonization of healthcare systems, which allows free movement of both patients and healthcare personnel between member states is a basic tenet of the European Union. Patients, Governments, and the General Public, wish to be reassured that treatment received in any country within Europe will be of similar high standard, delivered by professionals with similar levels of training and expertise.

Graph 2: Scope of the workforce for Health



Member States will have to assess what specialist skills they each need, taking into account that healthcare treatments change with the introduction of new technology, the effects of the ageing population on the pattern of disease and the increased number of elderly patients with multiple chronic conditions. A specific problem is that increased travel and mobility have also increased the risk of spread of diseases hitherto more prevalent in tropical countries. This is creating a new training requirement for clinicians and for those engaged in communicable disease surveillance.

Influencing factors and possible areas for action include:

- Ensuring that training courses are designed to take into account the special needs of people with disabilities (they should receive the same quality of care as able bodied patients and be provided with the specific health services they need).
- Focusing on health professionals' continuous professional development (CPD). Updating professional skills improves the quality of health outcomes and ensures patient safety.
- Developing training courses to encourage the retention or return to the workforce of mature workers.
- Providing management training for health professionals
- Fostering cooperation between the Member States in the management of staffing levels for health workers and enabling them to be more flexible.
- Developing possibilities for providing language training and assessments to assist safe medical workforce mobility.
- Creating European workforce Observatory which would assist Member States in planning future workforce requirements, training needs and meeting the demands imposed by technological developments.

UEMS (EUROPEAN UNION OF MEDICAL SPECIALISTS) is a non-governmental organization representing the national associations of medical specialists at European Level. With a current membership of 34 national associations, operating through 39 Specialist Sections and European Boards, UEMS is committed to promoting the free movement of medical specialists across Europe while ensuring the highest standards of training, which will pave the way to improvement in the quality of care of all European citizens. The areas of expertise of UEMS notably encompasses: Continuing Medical Education, Post Graduate Training and Quality Assurance.

At European level, the legal mechanism ensuring the free movement of doctors through the

recognition of their qualifications was established in the 1970s by the European Union. Sectorial Directives were adopted and one Directive specifically addressed the issue of medical training at European level. It was not until 2005, that the European Commission proposed to the European Parliament and Council a unique legal framework for the recognition of Professional Qualifications to facilitate and improve the mobility of all workers throughout Europe⁴. This Directive 2005/36/EC established the mechanism for automatic mutual recognition of the qualifications of medical doctors across all Member States; this is at present based only on the length of training in each Specialty and the title of qualification.

As part of the revision of the Professional Qualifications Directive of the European Commission, the UEMS Council has tasked each Specialist Section to produce a document: "Training Requirements in the Specialty of X", identifying European Standards for Postgraduate Medical Training in that specialty.⁵ These documents replace part of the Charter on Post Graduate Training, developed in 1994, relating to the recommendations for training in each specialty. The Training requirements include sections on Trainees, Trainers and Training Institutions. UEMS requires the addition of a European Curriculum in each Specialty, to provide a framework of standards common to each European Nation, whilst giving National Bodies the freedom to develop their own individual Postgraduate Training programmes.

With this background, the European Education Platform has been working to develop a European Curriculum, which is now open for discussion by the National Associations and Specialty Societies.

- 1 2008-based national population projections, EUROPOP 2008 convergence scenario.
- 2 European musculoskeletal health and mobility in Horizon 2020. SETTING PRIORITIES FOR MUSCULOSKELETAL RESEARCH AND INNOVATION. L. Lidgren, E. Gomez-Barrena, G. N. Duda, W. Puhl, A. Carr. BONE & JOINT RESEARCH, VOL. 3, No. 3, MARCH 2014; 48-50.
- 3 GREEN PAPER On the European Workforce for Health. COMMISSION OF THE EUROPEAN COMMUNITIES. Brussels, 10.12.2008. COM(2008) 725 final
- 4 Directive on Cross-border health cares adopted. Council of the European Union. Brussels 28 February 2011.
- 5 Training Requirements for Trauma & Orthopaedics. *European Standards of Postgraduate Medical Specialist Training*. info@uems.net

GENERAL CONSIDERATIONS

1. Principal goal of the curriculum

The intention of this curriculum is to enable nations to produce orthopaedic and trauma surgeons who are safe to screen the range of referrals that can be made to the orthopaedic and/or trauma service and to deal with the majority safely. They will be capable of recognizing more complex cases, their urgency and of arranging appropriate and timely onward referral.

The intention of this document is not to impose an external Curriculum, but only to act as a guide for all Associations that wish to implement a European Curriculum at the National Level.

2. Definition of the Speciality

The speciality of Orthopaedics and Traumatology involves prevention, diagnostics (including imaging techniques), non-operative, pharmacological and surgical treatments and rehabilitation of degenerative, inflammatory, infectious, metabolic and neoplastic pathologies, as well as the management of musculoskeletal trauma and its post-traumatic consequences. Furthermore it encompasses contributions to the multidisciplinary management of congenital and acquired deformities and functional disorders at any age.

Fundamentals of basic science, including applied biotechnology, evidence based medicine and ethics should underpin the educational process.

3. Name of the speciality: Orthopaedics and Traumatology

The majority of European nations are using the term of 'Orthopaedics and Traumatology' for the speciality described above. Since EFORT and EBOT have both terms in their name we would recommend both words in the title of the speciality and name of the national society, but it is also agreed that the existing names can be continued because in some nations orthopaedics and traumatology is summarized under the single term. It is also recognised that in a very few countries the specialties are completely separated.

Current names of the specific societies:

Albania	Albanian Association of Orthopaedic Surgery and Traumatology	AAOST
Montenegro	Association of Montenegrin Orthopaedics and Traumatology	AMOT
Malta	Association of Orthopaedic & Trauma Surgeons of Malta	AOTSM
Russian Federation	Association of Orthopaedists and Traumatologists of the Russian Federation	AOTRF
Austria	Austrian Society of Orthopaedics and Orthopaedical Surgery - Österreichische Gesellschaft für Orthopädie und Orthopädische Chirurgie	ÖGO
Belgium	Belgian Association of Orthopaedics and Traumatology - Belgische Vereniging voor Orthopedie en Traumatologie	BVOT
Belgium	Belgian Royal Society of Orthopaedic Surgery and Traumatology - Société Royale Belge de Chirurgie Orthopédique et de Traumatologie	SORBCOT
United Kingdom	British Orthopaedic Association	BOA

Bulgaria	Bulgarian Orthopaedics and Traumatology Association	BOTA
Croatia	Croatian Orthopaedic and Traumatology Association - Hrvatsko Udruženje Ortopeda i Traumatologa	COTA/HUOT
Croatia	Croatian Orthopaedic Society of the Croatian Medical Association	CrOS
Cyprus	Cyprus Association of Orthopaedic Surgery and Traumatology	CAOST
Czech Republic	Czech Society for Orthopaedics and Traumatology	CSOT
Denmark	Danish Orthopaedic Society - Dansk Ortopædisk Selskab	DOS
Germany	Deutsche Gesellschaft für Orthopädie und Orthopädische Chirurgie	DGOOC
Germany	Deutsche Gesellschaft für Unfallchirurgie DGU - German Society for Trauma Surgery	DGU
Estonia	Estonian Orthopaedic Society - Eesti Traumatoloogide-Ortopeedide Selts	ETOS
Finland	Finnish Orthopaedic Association - Suomen Ortopediyhdistys	SOY-FOA
France	French Society of Orthopaedic Surgery and Traumatology - Société Française de Chirurgie Orthopédique et Traumatologique	SOFcot
Greece	Hellenic Association of Orthopaedic Surgery & Traumatology	HAOST
Hungary	Hungarian Orthopaedic Association - Magyar Ortopéd Társaság	MOT/HOA
Iceland	Icelandic Orthopaedic Society - Íslenskra Bæklunarlæknafélagið	IBF
Ireland	Irish Orthopaedic Association	IOA
Italy	Italian Society of Orthopaedics and Traumatology - Società Italiana di Ortopedia e Traumatologia	SIOT
Kosovo	Kosovo Society of Orthopaedics and Trauma Surgeons	KSOTS
Latvia	Latvian Association of Traumatology and Orthopaedics - Latvijas Traumatologu un Ortopēdu Asociācija	LTOA
Lithuania	Lithuanian Society of Orthopaedics and Traumatology / Lietuvos Ortopēdu Traumatologu Draugija	LSOT/LOTD
Luxembourg	Luxembourgian Society of Orthopaedics and Traumatology - Société Luxembourgeoise d'Orthopédie et de Traumatologie	SLOT
Macedonia, the Former Yugoslav Republic of	Macedonian Association of Orthopaedics and Traumatology	MAOT
Netherlands	Netherlands Orthopaedic Association - Nederlandse Orthopaedische Vereniging	NOV
Norway	Norwegian Orthopaedic Association - Norsk Ortopedisk Forening	NOF
Bosnia & Herzegovina	Orthopaedic and Traumatology Surgeons Association of Bosnia and Herzegovina	OTSABH
Poland	Polish Society of Orthopaedic and Traumatology	PTOITR
Portugal	Portuguese Society of Orthopaedics and Traumatology - Sociedade Portuguesa de Ortopedia e Traumatologia	SPOT
Germany	Professional Association of Orthopaedic Surgeons - Berufsverband der Fachärzte für Orthopädie und Unfallchirurgie e. V.	BVOU
Romania	Romanian Society of Orthopaedics and Traumatology - Societatea Romane de Ortopedie Si Traumatologie	SOROT
Serbia	Serbian Orthopaedic Trauma Association	SOTA
Slovakia	Slovak Orthopaedic and Traumatologic Society - Slovenská Ortopedická a Traumatologická Spoločnosť	SOTS
Slovenia	Slovenian Orthopaedic Society - Združenje Ortopedov Slovenskega Zdravniškega Društva	SOA/ZOSZD
Spain	Spanish Orthopaedic and Traumatology Society - Sociedad Española de Cirugía Ortopédica y Traumatológica	SECOT
Sweden	Swedish Orthopaedic Association - Svensk Ortopedisk Förening	SOF
Switzerland	Swiss Society of Orthopaedic Surgery and Traumatology - Schweizerische Gesellschaft für Orthopädie und Traumatologie - Société Suisse D'Orthopédie et de Traumatologie	SGOT-SSOT
Turkey	Turkish Society of Orthopaedics and Traumatology - Türk Ortopedi ve Travmatoloji Birliği Derneği	TSOT/TOTBİD
Ukraine	Ukrainian Association of Orthopaedic Surgeons & Traumatologists	UAOST

4. Framework of educational structure: duration of training and level of competence

The process of education should be guided and controlled by national authorities responsible for health care provision. There has to be the freedom to choose an appropriate training concept, which enables the doctor to obtain thorough knowledge of the complex field of Orthopaedics & Traumatology, according to national facilities and needs. Nations have different requirements concerning degrees and diplomas and certification of medical education with respect to eligibility to enter residency programmes. The educational process in the curriculum should include a basic clinical education and lead to a progressive increase in knowledge and skills in the speciality. Due to the different structures and facilities of clinical departments this process can be modified individually, but

the concept of generalisation and modularisation should allow an appropriate programme to be established for each individual.

It is recommended that the first phase of the training is to cope with routine tasks in the healthcare system including the management of medical emergencies, first aid, the basics of perioperative and post-traumatic care, as well as further development of the skills of communication with the patient, health care personnel and medical colleagues, initiated in medical school and respecting ethical and humanitarian principles.

After this basic education the content of the curriculum covers the whole spectrum of musculo-skeletal pathology and comprises knowledge, experience, clinical skills and attitudes, and professional behaviour. The educational process is related to the development of a level of competence in which the specific content is repeated in increasing levels of complexity, which can be thought of as a spiral developmental process, returning to the same topics repeatedly, at progressively higher levels of competence, throughout the years of residency. The different topics of the speciality also can be formed in blocks and modules supporting the development of competence.

The **levels of competence** in surgical or manual skills can be simplified as follows:

Level 1 - to know

Level 2 - to see

Level 3 - to perform with supervision

Level 4 - to perform without supervision

The content should be organized to achieve at first a general view of the wide spectrum of the specialty, followed by a modular process of developing knowledge and skills in more specific areas, bearing in mind that at first, particularly with respect to skills, the clinical situation will not allow simultaneous development to level 3 and 4 in all topics. These levels will therefore be achieved in defined orthopaedic and traumatology modules according to the special interests of the hosting department, the demands of the health care that is required as well as the talents of the individual resident. Non-operative treatment, rehabilitation and prevention are also mandatory to underpin the development of comprehensive surgical skills and excellence.

Generalisation, modularisation and competence development are a dynamic process during a training that will take at least 5 years. A clear pathway comprising rotations to other institutions or departments is essential to guarantee the quality and quantity of content coverage across the generality of trauma and orthopaedics to allow completion of the training programme. Therefore only institutions that provide the full range of the orthopaedic and traumatology spectrum (some large acute hospitals and university departments) will be capable of providing the whole programme and the majority, if not all, will require the rotation of trainees to other units to complete their general training to European

standards. Exposure to bone tumours, children's orthopaedics, rheumatology, spinal surgery and the full range of regional specialties, arthroscopy and joint preserving surgery, joint replacement and revision surgery has to be achieved.

Specialisation

Specialisation and expertise should be provided by a fellowship process after completion of the General Training provided in a residency and described in this document. The content and structure of these programmes is beyond the scope of this curriculum and should be developed by the Specialty Societies. Fellowship level training will be related to the requirements of each specific speciality with its own reference points in terms of quantity, quality and structure.

The modularisation of the orthopaedics and traumatology curriculum should allow the resident to reach at least level three in most fields and allow him/her to deal with patients in a holistic way, providing diagnostic and first line treatment for the common conditions of the locomotor system, and to fulfil general on-call requirements in an orthopaedic and traumatology setting. The definitive surgical treatment of polytrauma for example is multidisciplinary and full competence is often not achieved in residency, but a fellowship in a high level trauma centre should serve this purpose and can provide the experience necessary to reach the highest standards in the treatment of this challenging problem. In summary, the concept of Training in the Generality of Orthopaedic Surgery and Traumatology, leading to Certification and followed by Specialist Training at fellowship level in fields of the Trainee's choice is essential in providing a universal standard of Orthopaedic Competence, providing the basis for specialist care.

	level of competence	required duration
Specialisation (Fellowship)		depending on specialty
<p>The diagram illustrates a cyclical process. At the center is a circle labeled 'Core curriculum of Orthopaedics and Traumatology'. This core is surrounded by 'General education'. Two curved arrows form a circle around the core: one at the top labeled 'Modularization' and one at the bottom labeled 'Generalisation', indicating a continuous cycle between these two concepts.</p>	<p>4</p> <p>3</p> <p>2</p> <p>1</p>	<p>5 years (min)</p>
Basic clinical education (Internship)		

The Core Curriculum in Orthopaedics and Traumatology

Defined in Pathologies

- inherent
- growth associated
- caused by bone metabolism
- caused by infections
- caused by nervous system
- caused by systematic diseases
- caused by bone and soft tissue tumours
- caused by inflammation
- caused by sports
- caused by injuries
- caused by medical interventions

Defined in Areas

- shoulder, elbow, upper arm
- lower arm and hand
- pelvis, hip and thigh
- knee
- lower leg and foot
- cranium, body cavity
- spine

Defined in Patient Groups

- neonates
- children and adolescents
- adults
- older people

Differentiated in Diagnosis

- Imaging methods
- Specialist laboratory medicine
- Puncture and biopsy
- Investigation techniques

Differentiated in Conservative Therapy

- Physical – medical measures, ergo therapy, manual medicine, complementary therapies
- Treatment with immobilisation or corrective bandage
- Orthoses, prosthetics, therapeutic products and medical aid
- Pain-relief therapy
- Non-Operative treatment (manipulation) of fractures and dislocations

Differentiated in Operative Therapy

- Arthroscopy
- Reconstructive procedures
- Osteotomies
- Osteosyntheses
- Resections
- Endoprosthetics
- Intervention in nerves, vessel and connective tissue (tendon-, muscle- and ligament repair/reconstruction)
- Amputation

5. Entrance requirements

To enter the programme in orthopaedics and traumatology trainees should have demonstrated competence in working as a team member, assessing emergency patients and initiating investigations and treatment, managing the perioperative care of patients and performing simple invasive and operative procedures.

The residents should have rotated through a basic surgical training programme that equips them to perform as a member of a surgical team, receive emergency patients, initiate diagnostic tests and management, manage the perioperative care of surgical patients and recognise and treat common complications. They should be a safe and useful assistant in the operating room and be able to perform simple procedures under minimal supervision. The basic part can be included in the overall curriculum or undertaken independently prior to embarking on orthopaedic training.

Selection for an orthopaedic training programme is usually competitive, after completion of basic medical/surgical foundation. The institutions providing training must provide the infrastructure (including the financial and administrative elements) to allow the trainee access to inpatients, outpatients and theatre settings. It should comply with relevant quality assurance and surveillance mechanisms designed to maintain the quality of training.

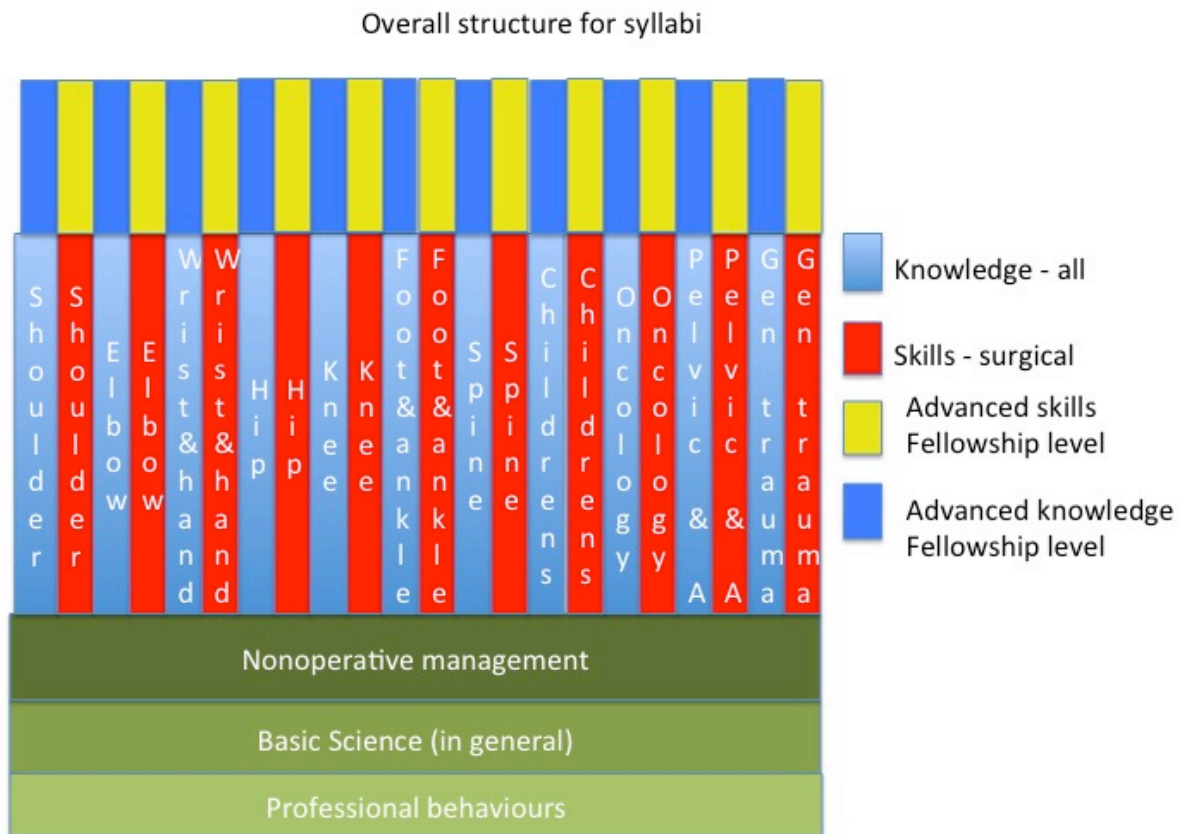
6. Financial and administrative structure of education system

In order to support a valid educational programme public funding for post graduate education is necessary and the mandate of education has to be matched by financial resources. The institutions undertaking the educational task have to be recognized in their own activities and supported substantially to allow a steady programme. It is also fundamental to match the number of trainees accepted into national training programmes with the number of Specialist posts required by the authorities responsible for manpower planning.

The organisation of training, including legislative requirements, needs to be adapted to individual national state regulations, as well as European Union directives.

SYLLABUS

A modular syllabus, which is adaptable to the differing needs of member nations, is proposed. The foundation is a professional behaviours syllabus in which all trauma and orthopaedic surgeons should gain competence. Thereafter there are syllabi for knowledge and skills, the level to which modules are completed depending whether operative surgery is a component of the training programme or not, and whether components such as trauma and rheumatology are national requirements. It is envisaged that within the specialty sections of the knowledge and skills syllabi each nation can stipulate whether training is to the level of the generalist surgeon who is expected to triage complex cases to specialists, or to 'fellowship' level where trainees develop a narrow field of interest prior to award of European certification. This can be represented diagrammatically thus –



The professional behaviours syllabus is relevant to all doctors and is a fundamental building block for the orthopaedic curriculum. There are also modules covering the basic science of orthopaedic practice and non-operative management that will be essential for all. Thereafter a series of regional modules can be completed before certification of general training. Completion of all modules will produce a surgeon capable of managing unselected trauma and orthopaedic patients safely, being capable of dealing with the majority him - or herself and being able to properly identify which patients need onward referral and making the necessary arrangements with appropriate urgency. After certification, fellowship training can be undertaken by those wishing to develop a Specialist practice in Trauma and/or Orthopaedic Surgery and the relevant curricula are developed by the European Specialist Societies,

Levels of attainment in the skills syllabus have been mentioned in the general introduction thus –

- Level 1 - to know
- Level 2 - to see
- Level 3 - to perform with assistance
- Level 4 - to perform without assistance
- Level 5 - capability for independent practice

Levels can also be applied to the knowledge syllabus (Blooms taxonomy) and this is used in, for example, grading the difficulty of examination questions and tasks -

- Level 1 - knows
- Level 2 - understands
- Level 3 - applies what is known correctly
- Level 4+ - analysis, evaluation and creation of new knowledge

Ultimately it may be possible to specify the expected level of attainment in each syllabus component across Europe. For now this level of detail has not been specified, but nations may choose to stipulate expected levels of attainment among their own trainees, or use these levels to prescribe training for each attachment or between each appraisal.

The modular syllabus has been coded to allow modules to be defined. At the broadest level we have

- A - Professional behaviours
- B - Knowledge
- C - Skills

At the next level is the broad specialty description so

- B1 - Knowledge / Orthopaedic Science
 - B2 - Knowledge / Shoulder
 - B3 - Knowledge / Elbow
- etc.

In this way the syllabus is broken down into a series of topics, which together encompass the generality of orthopaedics and traumatology. Specific lists of defined procedures and techniques have been avoided, as these may change with time and may vary from nation

to nation. It should also be noted that where there is a numerical list in the same section, this has been arranged alphabetically to avoid misinterpretation of lists as ranks of priority. However the list is still numbered. The purpose of the numbering system is not to assign importance but simply to code the syllabus. This will allow every component of the syllabus to be assigned an alphanumeric code, which can then be used for coding questions in examination question banks, selecting questions to ensure examinations cover the whole, or specified parts of, the curriculum and numerous other purposes. For example, therefore:

C5.3.2 – management of hip fractures (skills syllabus)

Note that although levels of attainment can be assigned to each syllabus section, this can only give a crude oversight of an individual's competence. Specific workplace based assessments may be used where appropriate, as described in the assessment section. For example a nation may require that total hip replacement is assessed more carefully, both in terms of numbers performed and in the performance of specific operative procedures (eg. total hip replacement – assessment of consent process, operative planning, theatre set up and communication, surgical approach, preparation and fixation, closure, operation note and review of post op radiographs). This detail is not elaborated in the syllabus, which has used broad terms in many areas to allow flexibility and adaptation.

- A, - Professional behaviours**
- B, - Knowledge**
- C, - Skills**

A, Professional behaviours syllabus

1. Assessing others
2. Audit, quality improvement and research skills
3. Awareness of legislation relevant to practice and compliance
4. Awareness of the limits of competence/ seeking appropriate advice
5. Breaking bad news
6. Communicating clearly and honestly
7. Competence in writing reports for external agencies
8. Confidentiality
9. Critical evaluation of literature and learning materials
10. Holistic approach to the patient
11. Maintaining patient safety in all deeds and actions
12. Organisational skills
13. Promotion of healthy behaviour
14. Recognising and dealing with failure
15. Safe record keeping
16. Sharing decision making
17. Showing respect to patients, families, public and colleagues
18. Taking appropriate infection control measures including awareness of own health and its impact on work
19. Teaching and presentation skills
20. Trustworthiness and responsible use of resources

21. Understanding of prevailing structure of healthcare systems relevant to practice
22. Working flexibly, efficiently and safely
23. Working in a team and leading teams

B, Knowledge Syllabus

B1. Orthopaedic Science

B1.1 **Anatomy** of the musculoskeletal system

B1.2 **Physiology** of musculoskeletal tissues

B1.3 **Pathology**

B1.3.1 General

- venous thromboembolism
- wound healing
- infection
- compartment syndrome
- metabolic response to trauma
- genetic disorders with orthopaedic manifestations
- immunocompromise including HIV
- infectious diseases impacting on surgery
- pain and pain management

B1.3.2 Musculoskeletal

- fracture healing
- tendon and ligament healing
- nerve healing and repair
- osteoarthritis
- inflammatory arthropathies
- metabolic bone disease
- osteonecrosis and osteochondritis
- heterotopic bone formation
- amputation

B1.4 Oncology

- primary bone tumours – benign and malignant
- soft tissue tumours
- metastatic bone disease

B1.5 Biomechanics and Biomaterials

- biomechanics of implantable materials and natural tissues
- fractures and fracture fixation
- wear and corrosion
- implant design
- gait lab – movement analysis

B1.6 Investigations

- radiation safety
- radiological imaging
- ultrasound imaging

- MRI
- electrophysiological tests
- nuclear medicine
- serological tests

B1.7 Interpreting evidence and implementing change

- statistics
- epidemiology
- study design
- critical evaluation of the literature
- audit
- quality improvement activities
- assessment of outcomes

B1.8 Miscellaneous

- theatre design
- patient environment
- sterilization
- antibiotics and infection control
- ethics, including consent
- assessment of disability

B2, Shoulder

B2.1 Foundation knowledge

B2.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B2.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B2.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography
- neurophysiological

B2.2 Shoulder trauma

- B2.2.1 - clavicle fractures
 - scapula and glenoid fractures
 - proximal humerus fractures
 - dislocations and fracture dislocations of the shoulder girdle

B2.3 Elective shoulder

- B2.3.1 Specific disorders
 - osteoarthritis
 - inflammatory arthropathy
 - joint sepsis
 - avascular necrosis
 - sequelae of childhood disease
 - soft tissue disorders
 - neoplastic
- B2.3.2 Non-operative management
 - splints and orthoses
 - injection / aspiration
 - physical therapies
- B2.3.3 Surgical management
 - arthroscopy
 - arthroplasty
 - resection arthroplasty
 - hemiarthroplasty
 - primary arthroplasty including reverse geometry
 - revision arthroplasty
 - arthrodesis
 - tendon surgery – biceps and rotator cuff
 - osteotomies
 - surgical management of stiffness
 - surgical management of instability

B3, Elbow

B3.1, Underpinning knowledge

- B3.1.1 Science
 - anatomy
 - surgical approaches
 - biomechanics
 - epidemiology
- B3.1.2 Clinical evaluation
 - history
 - physical examination
 - assessing outcomes and disability

B3.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography
- neurophysiological

B3.2, Elbow trauma

- B3.2.1 - distal humerus fractures
- radial head/neck fractures
 - proximal ulna fractures
 - dislocations and fracture dislocations of the elbow

B3.3, Elective elbow

B3.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy
- joint sepsis
- avascular necrosis
- sequelae of childhood disease
- soft tissue disorders
- neoplastic

B3.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B3.3.3 Surgical management

- arthroscopy
- arthroplasty
- resection arthroplasty
- interposition arthroplasty
- hemiarthroplasty
- primary arthroplasty
- revision arthroplasty
- arthrodesis
- tendon surgery – distal biceps, triceps
- open joint preserving surgery
- osteotomies
- surgical management of stiffness
- surgical management of instability

B4, Wrist and Hand

B4.1, Underpinning knowledge

B4.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B4.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B4.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography
- neurophysiological

B4.2, Wrist and hand trauma

B4.2.1 Distal radius fractures

- carpal fractures
- hand fractures
- dislocations and fracture dislocations in the hand and wrist
- ligament sprains and ruptures
- tendon, nerve and vascular lesions

B4.3, Elective wrist and hand

B4.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy
- joint sepsis
- avascular necrosis
- sequelae of childhood disease
- soft tissue disorders (inc synovitis, tendinopathies etc)
- long term consequences of nerve injury and dysfunction
- neoplastic
- congenital deformities

B4.3.2 Nonoperative management

- splints and orthoses
- injection / aspiration
- physical therapies

B4.3.3 Surgical management

- arthroscopy
- arthroplasty
- resection arthroplasty
- interpositional arthroplasty
- hemiarthroplasty
- primary arthroplasty
- revision arthroplasty
- arthrodesis
- soft tissue and tendon surgery – flexor and extensor
- open joint preserving surgery
- osteotomies
- peripheral nerve and vascular surgery
- surgical management of stiffness
- surgical management of instability
- surgical management of deformity
- surgery for lumps, nodules and other tumours

B5, Hip

B5.1 Foundation knowledge

B5.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B5.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B5.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography

B5.2, Hip trauma

B5.2.1 Intracapsular fractures

- extracapsular fractures
- dislocations
- periprosthetic fractures

B5.3, Elective hip

B5.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy
- joint sepsis
- avascular necrosis
- sequelae of childhood disease
- soft tissue disorders
- bony deformity and variations including impingement
- neoplastic

B5.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B5.3.3 Surgical management

- arthroscopy
- arthroplasty
- resection arthroplasty
- hemiarthroplasty
- primary arthroplasty
- revision arthroplasty
- arthrodesis
- tendon surgery
- open joint preserving surgery
- osteotomies
- surgical management of stiffness
- surgical management of instability

B6, Knee

B6.1, Foundation knowledge

B6.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B6.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B6.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine

- radiological
- MRI / MR arthrography

B6.2, Knee trauma

B6.2.1 Distal femoral fractures

- patellar fractures
- tibial plateau fractures
- dislocations and fracture dislocations of knee, patella
- ligament, meniscal and articular surface injuries

B6.3, Elective Knee

B6.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy
- joint sepsis
- avascular necrosis and osteochondritides
- sequelae of childhood disease
- soft tissue disorders
- neoplastic

B6.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B6.3.3 Surgical management

- arthroscopy
- osteotomies
- arthroplasty
- primary arthroplasty – uni, bi, tricompartmental and patellofemoral
- revision arthroplasty
- arthrodesis
- tendon surgery
- open joint preserving surgery
- surgical management of stiffness
- surgical management of instability

B7, Foot and Ankle

B7.1, Foundation knowledge

B7.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B7.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B7.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography
- neurophysiological

B7.2, Foot and ankle trauma

B7.2.1 Pilon fractures

- malleolar fractures
- calcaneal fractures
- talus fractures
- mid foot and forefoot fractures
- dislocations and fracture dislocations

B7.3, Elective foot and ankle

B7.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy
- joint sepsis
- avascular necrosis and osteochondritides
- sequelae of childhood disease
- neurological disease
- forefoot deformities.
- soft tissue disorders
- neoplastic

B7.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B7.3.3 Surgical management

- arthroscopy
- arthroplasty
- resection arthroplasty
- interposition arthroplasty
- primary arthroplasty
- revision arthroplasty
- arthrodesis
- tendon surgery
- open joint preserving surgery
- osteotomies

- surgical management of stiffness
- surgical management of instability

B8, Pelvis and Acetabulum

B8.1, Foundation knowledge

B8.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B8.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B8.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography

B8.2, Pelvic and acetabular trauma

B8.2.1 Pelvic and sacral fractures

- acetabular fractures
- femoral head fractures
- pelvic ring fractures and fracture dislocations
- sacral fractures

B8.3, Elective pelvis and acetabulum

B8.3.1 Specific disorders

- inflammatory arthropathy
- pelvic instability
- joint sepsis
- avascular necrosis
- sequelae of childhood disease
- soft tissue disorders
- neoplastic

B8.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B8.3.3 Surgical management

- arthrodesis
- tendon surgery – decompression, release
- osteotomies
- surgical management of stiffness
- surgical management of instability

B9, Spine

B9.1, Foundation knowledge

B9.1.1 Science

- anatomy
- surgical approaches
- biomechanics
- epidemiology

B9.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B9.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography
- neurophysiology including spinal cord monitoring

B9.2, Spine trauma

B9.2.1 - fractures of the spinal column

- dislocations of the spinal column
- fracture dislocations of the spinal column
- spinal cord injury

B9.3, Elective spine

B9.3.1 Specific disorders

- osteoarthritis
- inflammatory arthropathy including Ankylosing spondylitis
- spine sepsis
- spinal stenosis
- spondylolisthesis
- spinal deformity
- sequelae of childhood disease

- disc disease
- spinal tumours – primary and metastatic

B9.3.2 Non-operative management

- splints and orthoses
- injection / aspiration
- physical therapies

B9.3.3 Surgical management

- arthroplasty
- discectomy
- decompression – nerve root and dural sac
- arthrodesis – instrumented and non-instrumented
- osteotomies
- correction of deformity

B10, Oncology

B10.1 Foundation knowledge

B10.1.1 Science

- anatomy
- surgical approaches specific to tumour management
- epidemiology

B10.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B10.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography

B10.2 Acute oncology

B10.2.1 Nerve and spinal cord decompression

- management of impending fractures and pathological fractures

B10.3 Elective oncology

B10.3.1 Specific disorders

- benign bone tumours
- benign soft tissue tumours
- malignant bone tumours
- malignant soft tissue tumours
- tumour-like disorders

- B10.3.2 Non-operative management
- adjuvant therapies – radiotherapy, chemotherapy etc

- B10.3.3 Surgical management
- biopsy
 - limb preserving surgery
 - amputations

B11, Children's Orthopaedics

B11.1 Foundation knowledge

- B11.1.1 Science
- anatomy
 - surgical approaches in children
 - biomechanics of the immature musculoskeletal system
 - epidemiology and genetics of childhood disease
 - musculoskeletal growth and development

- B11.1.2 Clinical evaluation
- history
 - physical examination
 - assessing outcomes and disability

- B11.1.3 Investigations
- blood parameters
 - sonographic
 - nuclear medicine
 - radiological
 - MRI / MR arthrography

B11.2 Childrens trauma

- B11.2.1 Particularities of children's fractures
- supracondylar fracture of the elbow
 - growth plate injuries
 - differences between children's and adult fractures
 - non accidental injury/child abuse

B11.3 Elective Childrens orthopaedics

- B11.3.1 Specific disorders
- developmental dysplasia of the hip
 - slipped capital femoral epiphysis
 - perthes disease
 - alignment disorders in the lower limb
 - foot deformities including club foot
 - Spina Bifida

- cerebral palsy
- spinal deformities in children
- orthopaedic manifestations of genetic congenital and metabolic disorders
- soft tissue disorders
- neoplastic

B11.3.2 Non-operative management

- splints, orthoses and casts
- injection / aspiration
- physical therapies

B11.3.3 Surgical management

- arthroscopy
- arthrodesis
- tendon surgery
- osteotomies
- surgical management of stiffness
- soft tissue surgical procedures

B12, General Trauma

B12.1 Foundation knowledge

B12.1.1 Science

- anatomy
- biomechanics of fractures and fracture fixation
- epidemiology of trauma and specific injuries
- metabolic response to trauma
- the polytraumatised patient

B12.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes and disability

B12.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI / MR arthrography

B12.3.1 Specific disorders

- compartment syndrome
- acute neurovascular injuries
- soft tissue trauma

B12.3.2 Non-operative management

- splints and orthoses

- physical therapies

B12.3.3 Surgical management

- resuscitation, emergency surgery
- percutaneous, plate, nail, monolateral and circular fixators
- long bone fractures
- periarticular fractures

C, Skills Syllabus

C1 Professional Behaviour

C2, Shoulder

C2.1 Clinical examination

C2.2 Safe surgical approaches to shoulder

C2.3 Trauma

C2.3.1 Non-operative

- reduction of dislocated shoulder
- reduction of fractures
- application of splints, braces and casts

C2.3.2 Operative

A safe method of management of shoulder trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- clavicle shaft and distal clavicle fractures
- AC joint stabilisation
- scapular fractures and glenoid fractures
- glenohumeral dislocation
- proximal humerus fractures
- tendon injuries in shoulder: rotator cuff, proximal biceps, pectoralis major

C2.4 Elective

C2.4.1 Non-operative

- injections – AC Joint, sub-acromial space, glenohumeral joint

C2.4.2 Operative

- arthroscopic inspection of glenohumeral joint,
- arthroscopic management of instability and rotator cuff disease
- open / miniopen management of instability and rotator cuff disease
- surgery for frozen shoulder, synovectomy and capsular release
- arthroplasty for degenerative disease: hemiarthroplasty, total arthroplasty
- revision arthroplasty

- biceps tenodesis and tendon transfers around the shoulder
- management of compression neuropathies: suprascapular nerve
- treatment of nonunions: clavicle, scapula, humerus
- osteotomies
- shoulder fusion

C3, Elbow

C3.1 Clinical examination

C3.2 Surgical approaches to elbow

C3.3 Trauma

C3.3.1 Non-operative

- Reduction of dislocated elbow
- Reduction of fractures
- Application of splints, braces and casts

C3.3.2 Operative

The management of elbow trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- fractures of the distal humerus
- fractures of the proximal ulna
- fractures of the radial head
- operative management of acute dislocations and fracture dislocations
- tendon injuries in elbow: distal biceps, triceps

C3.4 - Elective

C3.4.1 Non-operative

- injections – elbow joint, enthesopathies

C3.4.2 Operative

- arthroscopic inspection of elbow joint
- arthroscopic removal of loose bodies
- arthroscopic soft tissue surgery, capsular procedures, release
- management of elbow instability
- arthroplasty in the elbow: total replacement, radial head replacement
- revision arthroplasty
- management of enthesiopathies: tennis and golfer's elbow
- management of compression neuropathies: ulnar, posterior interosseous* identify purpose of asterisk
- treatment of nonunions
- osteotomies
- elbow resection arthroplasty
- fusions in elbow
- open elbow release, capsulotomy, heterotopic ossification, bone resection*Asterisk?

C4, Wrist and Hand

C4.1 Clinical examination

C4.2 Safe surgical approaches to wrist and hand

C4.3 Trauma

C4.3.1 Non-operative

- reduction of dislocations in hand and wrist
- reduction of fractures
- application of splints, braces and casts

C4.3.2 Operative

The management of wrist and hand trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- distal radius fractures
- carpal, metacarpal and phalangeal fractures
- acute dislocations, fracture dislocations and ligament injuries
- tendon injuries in the hand: flexor and extensor
- nerve injuries
- vascular injury/amputations and replantation

C4.4 - Elective

C4.4.1 Non-operative

- injections – including carpal, basal thumb, carpal tunnel, tendon sheaths

C4.4.2 Operative

- arthroscopic inspection of wrist joint
- arthroscopic soft tissue surgery
- management of wrist instability
- arthroplasty in the hand
- revision arthroplasty
- management of tendon and tendon sheath pathology
- management of compression neuropathies
- treatment of nonunions and malunion
- osteotomies in the wrist and hand
- resection and interposition arthroplasty
- fusions in the hand
- joint arthrolysis
- tendon reconstruction
- tendon transfers
- tendon lengthening, tenotomies
- excision of lumps and masses
- dupuytren's disease
- neurolysis
- skin cover in the hand

C5, Hip

C5.1 Clinical examination

C5.2 Safe surgical approaches to hip

C5.3 Trauma

C5.3.1 Non-operative

- Reduction of dislocated hip
- Reduction of dislocated arthroplasty
- Reduction of fractures
- Application of splints, braces and casts
- Hip aspiration

C5.3.2 Operative

The management of hip trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- intracapsular fractures
- extracapsular including subtrochanteric fractures
- hip dislocation including femoral head fractures

C5.4 Elective

C5.4.1 Non-operative

- injection of the hip and trochanteric bursa

C5.4.2 Operative

- arthroscopic inspection of hip joint,
- arthroscopic removal of loose bodies,
- arthroscopic surgery, capsular and labral procedures, bone resection
- open joint preserving surgery, capsular and labral procedures, bone resection
- arthroplasty
- revision arthroplasty
- resection arthroplasty
- treatment of non-unions
- osteotomies
- arthrodesis

C6, Knee

C6.1 Clinical examination

C6.2 Safe surgical approaches to knee

C6.3 Trauma

C6.3.1 Non-operative

- reduction of dislocated knee / patella
- reduction of fractures
- application of splints, braces and casts
- aspiration of knee

C6.3.2 Operative

The management of knee trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- distal femur
- patellar fractures
- proximal tibial fractures
- tendon avulsions / ruptures

C6.4 Elective

C6.4.1 Non-operative

- injections – knee, bursae

C6.4.2 Operative

- arthroscopic removal of loose bodies,
- arthroscopic soft tissue surgery, capsular and meniscal procedures, arthrolysis
- management of knee instability: cruciate ligaments, collaterals and posterior corners, patellofemoral instability
- arthroplasty in the knee: total replacement, uni and bicompartimental replacement, patellofemoral replacement
- revision arthroplasty
- treatment of nonunions
- osteotomies
- arthrodesis

C7, Foot and Ankle

C7.1 Clinical examination

C7.2 Safe surgical approaches to foot and ankle

C7.3 Trauma

C7.3.1 Non-operative

- reduction of dislocated ankle
- reduction of dislocations in the foot
- reduction of fractures
- application of splints, braces and casts

C7.3.2 Operative

The management of foot and ankle trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- pilon fractures
- malleolar fractures and fracture-dislocations
- hindfoot fractures and fracture-dislocations (talus and calcaneum)
- midfoot and forefoot fractures and fracture-dislocations

C7.4 Elective

C7.4.1 Non-operative

- Injections – ankle, tendon sheaths, joints and bursae

C7.4.2 Operative

- arthroscopic removal of loose bodies
- arthroscopic soft tissue surgery, capsular procedures, arthrolysis and bone resection
- arthroscopic management of osteochondral defects
- open management of osteochondral defects
- arthrodesis of the foot and ankle joints
- total ankle arthroplasty
- revision arthroplasty
- management of tendinopathies and tendon ruptures
- management of compression neuropathies: Tarsal tunnel syndrome
- open soft tissue surgery, capsular procedures, release and bone resection
- osteotomies
- treatment of non-unions
- minimal invasive surgery and percutaneous surgery

C8, Pelvis and Acetabulum

C8.1 Clinical examination

C8.2 Safe surgical approaches to pelvis and acetabulum

C8.3 Trauma

C8.3.1 Non-operative

- assessment and emergency management of pelvic and open pelvic fractures
- application of splints and braces

C8.3.2 Operative

The management of pelvic trauma using plate, intramedullary and/or external fixation and joint replacement including but not limited to the following -

- external fixation
- anterior plating
- pelvic brim and iliac plating
- SI dislocation and sacral fractures – percutaneous and open screw/plate fixation
- acetabular fractures direct and indirect fixation

C8.4 - Elective

C8.4.1 Non-operative

- Injections – nerve root

C8.4.2 Operative

- pelvic fracture management
- acetabular fracture management
- combination injuries including combined lower limb trauma
- femoral head fractures
- treatment of non-unions
- osteotomies
- hip resection arthroplasty
- fusions – sacroiliac, pubic, hip
- prevention and excision of heterotopic bone
- drainage of pelvic abscesses

C9, Spine

C9.1 Clinical examination

C9.2 Safe surgical approaches to the cervical, thoracic, lumbar and sacral spine

C9.3 Trauma

C9.3.1 Non-operative

- assessment of spinal trauma and cauda equina syndrome
- safe handling of the potentially spine-injured patient
- postural reduction of dislocations and fracture-dislocations
- application of splints, braces and casts

C9.3.2 Operative

- cervical spine instrumentation / fusion
- halo or other traction device application
- dorso lumbar instrumentation / fusion

C9.4 Elective

C9.4.1 Non-operative

- injections – caudal, epidural, nerve root
- orthoses, splints and braces

C9.4.2 Operative

C9.4.2.1 Cervical spine

- anterior column reconstruction
- discectomy
- decompression
- disc replacement
- laminectomy / laminoplasty
- fusion

C9.4.2.2 Dorsolumbar spine

- anterior column reconstruction
- discectomy
- decompression
- disc replacement
- fusion
- laminectomy / laminoplasty
- kyphoscoliosis correction

C10, Oncology

C10.1 Clinical examination and assessment of suspected malignancy

C10.2 Safe surgical approaches in suspected and proven malignancy

C10.3 Elective

C10.3.1 Non-operative

- Needle biopsy

C10.3.2 Operative

- open biopsy
- intralesional resection
- marginal resection
- en bloc resection
- compartmental resection
- amputations
- extremity reconstruction and limb salvage

C11, Children's Orthopaedics

C11.1 Clinical examination

C11.2 Safe surgical approaches in children and the differences compared to adults

C11.3 Trauma

C11.3.1 Non-operative

- reduction of fractures and dislocations in children
- application of splints, braces, casts and skeletal traction

C11.3.2 Operative

The management of children's trauma using plate, intramedullary and/or external fixation and the differences compared to adult trauma including but not limited to the following -

- manipulation under anaesthesia and application of casts for fractures and fracture dislocations
- reduction and fixation with K-wires
- reduction and stabilisation of long bones

C11.4 - Elective

C11.4.1 Non-operative

- bracing
- casting

C11.4.2 Operative

- soft tissue releases
- manipulation under anaesthesia and application of hip spica
- open reduction for DDH
- osteotomies
- limb lengthening
- epiphysiodesis and growth modulation
- surgery of congenital abnormalities
- drainage of septic arthritis and osteomyelitis

C12 General Trauma

C12.1 Resuscitation skills

- Advanced Trauma Life Support
- leading resuscitation team in polytrauma
- handover to appropriate specialist teams
- securing airway, ensuring ventilation,
- Damage Control Orthopaedics, major haemorrhage protocols.
-

C12.2 Long bone shaft fractures

C12.2.1 Non-operative

- reduction of fracture
- splints, braces, cast
- skeletal traction

C12.2.2 Operative

- Percutaneous fixation,
- intramedullary nailing,
- plate fixation,
- external fixation

C12.3 Amputations

C12.4 Open fracture management

- Debridement
- Skin and soft tissue cover
- Vacuum therapy

C12.5 Compartment syndrome

C12.6 Skin and soft tissue lesions: skin grafts, flaps

C12.7 Bone reconstructive techniques

- harvesting bone graft
- bone transport
- composite grafts

C12.8 Neurovascular injuries

C13, Muscle and tendons

C13.1.1 Science

- anatomy
- biomechanics
- epidemiology

C13.1.2 Clinical evaluation

- history
- physical examination
- assessing outcomes

C13.1.3 Investigations

- blood parameters
- sonographic
- nuclear medicine
- radiological
- MRI

C13.2 Safe surgical approaches to muscle and tendons

C13.3 Trauma

C13.3.1 Non-operative

- application of splints, braces and cast

C13.3.2 Operative

- tendon injuries

C13.4 Elective

C13.4.1 Non-operative

- injections – tendon sheaths

C13.4.2 Operative

- endoscopic inspection of tendons
- endoscopic soft tissue surgery
- management of muscle and tendon injuries
- tendon reconstructions
- management of tendon and tendon sheath pathology
- compartment pathologies
- tendon transfers
- tendon lengthening, tenotomies

ASSESSMENT

INTRODUCTION

Assessments: Formative and Summative

Assessment of trainees should include formative and summative elements. Some countries have already developed sophisticated annual appraisals including tests of knowledge whilst others do not even have a system for regular monitoring of trainee progress. Similarly, some countries hold validated examinations at the end of training, which form one part of the assessment for certification, whilst others do not. Formative appraisal in particular, allows individual deficiencies to be addressed in a timely manner without prolonging the overall training time, or prolonging it minimally. It also allows Quality Assurance of the Training Centres and Trainers. National Associations and Training Authorities are tasked with developing their own annual appraisal systems.

The Interim EBOT examination is available to assist those countries where annual appraisal systems are not yet well developed, and will give valuable feedback on the progress of individual trainees to help them and their trainers to focus on future training. Details of the EBOT Interim examination are set out below:

EBOT Interim Examination

It has been recognised for some time that MCQs are the most effective way of assessing the knowledge base, and an annual MCQ examination is instrumental in encouraging trainees to improve their knowledge base. Examples of successful interim examinations include AAOS OITE and UKITE in UK. Interim examinations of various types are already in use in many European programmes. The EBOT Interim exam has been running since 2012 and provides a similar incentive. It has already been shown to be a unique and useful tool that hospitals, training programmes and Regional and National Postgraduate Education Organisations can use in order to improve the quality of orthopaedic and trauma training in Europe.. The anonymised results of the interim test are returned to both candidates and Training Directors, and show the candidate's ranking relative to his/her peers, locally, nationally and internationally. The information gathered so far from each of the previous exams has been extremely useful for the trainees who have a yearly assessment of the 5 different areas covered by the MCQ exam. Prior to a final exam they have a tool that can help them correct deficiencies in their knowledge.. Heads of Training also receive a global assessment of how their residents are doing and have the opportunity of comparing their performance with the other hospitals in the country or elsewhere in Europe. Consistent deficiencies in particular areas also allow external assessment of the individual training programme and permit adjustments to be made.

With this interim exam we are able to improve the quality of orthopaedic training in Europe and get a better quality of care for our orthopaedic patients.

At present, the Interim written examination is set in English as all European trainees are expected to read English, so they have access to the scientific literature. Translating an MCQ alters the sense and validity of the questions, and creates problems with validation of the whole examination.. The matter has been discussed at length with Board members and Trainers and it is agreed that for the time being the MCQ questions will continue to be in English, as are the questions in the Final examination. It may, however, eventually become feasible to provide an examination in different languages.

The principle of an interim exam is that trainees at all levels of their programme should take it, and it should be sat without specific prior revision. It is used both as an assessment of the trainee's level of knowledge retention, and as a guide to progression from year to year. Finally, it provides good practice in the gaming required to be successful at MCQs. Candidates are anonymised and their marks are graded according to their position relative to others in the same and other years of training. It allows trainees to see where they are in comparison to their peers. The anonymised results can also be used to assess the training programmes, both regional and national, and ultimately international, to see where deficiencies in the training provided lie, especially with regard to certain subjects, such as hands and paediatrics, and also basic sciences.

Summative Assessments

The principle of a final examination is increasingly becoming accepted as an effective tool for defining the competence of a surgeon trained in the Generality of Orthopaedics and Traumatology. Ideally it should take place towards the end of training, usually in the final year. It should assess overall competence and therefore cover the whole curriculum. the assessment is therefore for General rather than Subspecialist training. Most final examinations comprise a written MCQ paper, which tests the candidates' knowledge base, and a separate oral examination, which determines clinical skills and some aspects of professional behaviour. A clinical examination, which allows assessment of communication skills, physical examination and ability to make decisions about a live clinical scenario, is also used in some countries. Operative skill is not tested, as this requires ongoing evaluation by the trainer over a period of time, during local formative assessments. If a nation does not have a final examination, but wishes to introduce one, or wishes to supplement its own National Examination before certifying trainees, then the EBOT final examination is available to fulfil that function.

At present the EBOT examination comprises two parts, taken separately, with the written section sat in June in centres throughout Europe, and the oral examination

taken in October. The examination is currently in English only, but German and French versions of the Oral assessment are planned for 2015. A clinical examination in local languages is planned for the future.

It is important to recognise that successful completion of the EBOT examination is not the sole determinant of clinical competence and must be associated with a rigorous appraisal system before a trainee is recognised as a Specialist. This provides the National Regulatory Authority in each EU country with an important influence. If acquisition of Specialist Certification were dependent on both satisfactory appraisals throughout the training period AND successful completion of an examination which tests Knowledge, Clinical Skills and to an extent Professional Behaviour, then doctors without these qualifications would not be able to be employed as Certified Specialists. It should be emphasized that successful completion of a final examination should NOT confer Specialist status on its own.

Appraisal

Without dictating how each nation arranges its own training management, it is recommended that the following standards should be considered in assessment:

1. Trainees should keep a logbook of activity, which records not only the procedure but also the level of participation (assistant, performed under supervision, performed independently)
2. Annual assessment of progress. This should include a review of progress over the past year against the curriculum and planning objectives for the following year. A test of knowledge at defined points in the training is appropriate, and the EBOT interim examination is available to support trainers in this respect.
3. Workplace based assessments should be used to check the acquisition of competencies required for certification. Ideally this should be done with validated tools. A range of these are available to assist.
4. A final assessment before certification. This should ensure that the trainee is safe to practice across the curriculum elements defined by that country, and allows national variations to be transparent if/when workforce migration occurs. This could include an examination that includes testing of clinical knowledge and judgement and the EBOT final examination is available to support those countries that do not provide this independently but wish to improve their confidence in issuing certification that is valid across Europe.

Assessment throughout European Orthopaedic Residency

Annual appraisal
for orthopaedic
trainees (ALL)
- either alone or as part of the countries' annual appraisal

Annual EBOT Interim Exam - *European*

English



Part I - EBOT Written Exam - *European*

English

Part II - EBOT Clinical Exam - *National*

Local language

Part III - EBOT Oral Exam - *European / National*

Different
languages

European
Orthopaedic
Specialist
Diploma



European
Orthopaedic
Qualification

**Fellow of the European Board of Orthopaedics and Traumatology
FEBOT – (country)**

CONCLUSION

The intention of this document is to provide guidance for all Associations that wish to develop a framework for a Curriculum, acceptable to National Associations across Europe. It has been developed by consensus, with input from all the authorities identified in the introduction. It is recognised by both UEMS and EFORT that there is wide variation in the process of Education in Orthopaedics and Traumatology between the different nations in Europe, and we hope this curriculum will continue to improve the harmonisation of Orthopaedic practice, for the benefit of health professionals, national authorities and above all, patients.

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EFORT Head Office

ZA La Pièce 2
1180 Rolle, Switzerland

Phone +41 (0)21 343 4400

Fax +41 (0)21 343 4411

office@efort.org

www.efort.org



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