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Core curriculum (CC) of spinal surgery: a step forward in defining our profession

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Objective: The aim our study was to establish a core curriculum (CC) for spine surgery incorporating knowledge, skills and attitudes to help define spine surgery as a medical specialty and serve as a guide for specific spine surgery training.

Methods: A committee was established to prepare the CC. Five modules were established; Basic Sciences, Spinal Trauma, Degenerative Spine Diseases, Destructive Spine Pathologies and Spinal Deformity. Prepared CC modules were evaluated in a consensus meeting, translated and reevaluated in a second consensus meeting before being accepted as final.

Results: In the five modules, 54 subject headings (19 for Basic Sciences, 10 for Spinal Trauma, 4 for Degenerative Spine Diseases, 4 for Destructive Spine Pathologies and 17 for Spinal Deformity) and 165 specific subjects (59 for Basic Sciences, 32 for Spinal Trauma, 10 for Degenerative Spine Diseases, 23 for Destructive Spine Pathologies and 41 for Spinal Deformity) were defined. Learning outcomes and entry and exit criteria were defined for all subjects.

Conclusion: This CC may form the basis of spinal surgery training, defining spinal surgery as a medical specialty and help us spine surgeons to develop better defined identities.

Key words: Core curriculum; medical specialty; spinal surgery; surgical education.

Spine surgery has developed as a medical (sub)specialty for several decades. A fair number of 'spine fellowships' are offered globally, at the end of which a student is expected to graduate as a spine surgeon. However, the boundaries of a subspecialty may remain relatively un-

defined for a substantial time, even long after that very subspecialty has developed its own sub-specialties. As proposed by Russ et al.,^[1] a person graduating from a spine surgery education program must be able to answer several questions:

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QR (Quick Response) Code



- What does it mean to be a spine surgeon?
- What is expected of me when I graduate from a spinal surgery program?
- What should my role be amongst the diverse medical professionals with similar training?

It is our belief that the delineation of boundaries and responsibilities for spinal surgery is necessary and that one of the major steps to be undertaken to this end is the establishment of a core curriculum (CC). The CC of the spine was developed in an effort to guide spine surgery training for both students and trainers. It was also intended to provide guidelines for competency assessment and to thereby become the first and important step in the foundation of national and/or international Boards of Spine Surgery.

It is common knowledge that at this point in time, spine surgeons and trainees come from two different surgical subspecialties; orthopedics and neurosurgery. These two disciplines both contain spine as a field in their respective curricula but significant, albeit decreasing differences in these curricula do exist. A study by Wadey et al.^[2] demonstrated that orthopedic residents are not expected to learn surgical skills including fusion and instrumentation techniques (traditionally been the domain of orthopedics) but only to perform decompressions and discectomies (traditionally the domain of neurosurgery). It appears that there is a danger that the required spine curriculum will shrink to the absolute minimum in orthopedic residency programs in particular. Malempati et al. identified potential gaps and perceived deficiencies in the competencies of spine fellows in Canada, influenced by the background specialty of fellows and stressed the need for evidence-based curriculum changes.^[3] In this regard, a CC of spinal surgery may also be instrumental in defining the essential knowledge and skill levels expected from a spine surgeon, thereby promoting a broader base of requirements in the parent specialties retrospectively.

Therefore, a CC of spinal surgery is required for the purposes of:

- Defining spine surgery as a medical subspecialty,
- Providing an identity and delineating the responsibilities of spine surgeons,
- Promoting a broader base of spine surgery knowledge and skills training in orthopedics and neurosurgery residency programs.

The aim of this study was to introduce the CC of spine surgery developed by the Turkish Spine Society (TSS) for the purposes outlined above and to describe the methodology of this development process.

Materials and methods

Identifying the need to develop a CC of spine surgery, the TSS formed an *ad hoc* committee of "Curriculum and Competency Assessment" in 2012 in order to write and evaluate the curriculum. This committee consisted of five spine surgeons (three of orthopedics and two of neurosurgery origin) and one medical education specialist. This committee started with defining the spinal column as the skeletal structure extending from the occiput (included) to the thoracic cage (included) to the pelvis (included) and divided the broad base of knowledge and skills in spinal surgery into five modules:

- Basic Sciences
- Spinal Trauma
- Degenerative Spine Diseases
- Destructive Spine Pathologies (neoplasias and inflammatory conditions)
- Spinal Deformity

Each module was assigned to one of the spine surgeons of the committee as the leader, and these leaders formed workgroups of four people each for drafting the curriculum of their specific module, thereby forming an extended curriculum committee. Further definitions by this committee were the fields of competency, classified as *knowledge* (pertaining to theoretical knowledge of the subject), *skills* (pertaining to practical capabilities) and *attitudes* (pertaining to desired behavioral patterns). Entry and exit levels for all three of these competencies were defined in four step scales that may be listed as (adapted from Reference #4):

Knowledge:

1. Is aware of the subject
2. Knows basic concepts
3. General knowledge of the subject
4. Specific and detailed knowledge on the subject

Skills:

1. Knows about
2. Knows how
3. Shows how
4. Does

Attitudes:

1. Is aware of the behavioral pattern
2. Attains some importance
3. Understands importance
4. Adapts as standard behavior

Writing of the CC started with the drafting of re-

spective group curriculums. These were then compiled together and sent out to the entire membership of the spine society for criticism as well as input. These inputs were then incorporated into the first draft that was discussed at the first consensus meeting of the extended committee. Each and every detail of the draft CC was scrutinized in detail at this meeting and redundancies were corrected. Following this, the CC was then translated to English by a certified translator, followed by another consensus meeting by the extended committee (roughly six months after the first) in order to check the accuracy of the translation and to reevaluate the CC in its entirety. This second consensus meeting resulted in a substantial final shortening of the end product.

Results

Modules were divided into 54 subject headings (19 for Basic Sciences, 10 for Spinal Trauma, 4 for Degenerative Spine Diseases, 4 for Destructive Spine Pathologies and 17 for Spinal Deformity) and further down to 165 specific subjects, (59 for Basic Sciences, 32 for Trauma, 10 for Degenerative Spine Diseases, 23 for Destructive Spine Pathologies and 41 for Spinal Deformity). Learning outcomes were described for all subjects and each subject was assigned desired entrance (S) and exit (F) levels of competency based on these learning outcomes. The CC developed using the methodology outlined above may be seen in Appendices 1 to 5, pertaining to basic sciences, trauma, degenerative conditions, destructive pathologies and deformity, respectively.*

Discussion

This study aimed to introduce a CC of spine surgery and the methodology used in the development process. This CC was developed by an *ad hoc* committee for this specific purpose. The broadest base of knowledge was divided into 5 modules of Basic Sciences, Spinal Trauma, Degenerative Spine Diseases, Destructive Spine Pathologies and Spinal Deformity, which in turn yielded 54 subject headings and 165 subjects. Desired levels of knowledge, skills and attitudes were defined for each subject.

This CC was not the first effort to develop a spine curriculum. The AOSpine community previously developed and distributed a curriculum document.^[5] In this curriculum, the base of knowledge was divided into six areas of pathology (trauma, tumor, degenerative, deformity, infection, and metabolic, inflammatory and genetic) each having their own competencies and learning outcomes listed. Our proposed CC is very different from

the AOSpine CC in certain aspects; it aimed at a much broader purpose ranging from the definition of a medical specialty to providing a standard identity to spine surgeons to forming the base of a spinal surgery board; it included and defined not only the knowledge basis but desired skills and attitude levels; and defined specific entry and exit levels in each competency. To this end, the TSS CC is much closer to the CCs developed by other medical specialty societies. The purpose of developing a spinal surgery identity and defining spinal surgery as a medical specialty has been a very important motivation for the present effort.

At the beginning of this endeavor, the *ad hoc* curriculum committee realized that there were no similar efforts to develop a full spine curriculum and no standardized methodology for the development of such. The methodology described here is a modification of the methodology of British Orthopaedic Association^[6] adapted specifically to our needs and purposes. It is further realized that it may be virtually impossible to validate this methodology as well as the product in the foreseeable future. Instead, the presented methodology and CC should be accepted as an alternative. The grading of attitudes developed by the TSS committee for the purposes of this specific CC is an example. It may be argued that attitudes need not be graded at all and that a trainee would either have or not have the specified attitude. On the other hand, it may be argued that there are different levels of awareness for these specified attitudes. This second view has been adapted in the creation of the CC, not necessarily as the standard methodology but rather, as an alternative.

In addition, it is also realized that the entry and exit levels of the competencies are arbitrary, but necessary. As a basis, it is known that those training in the specialty of spinal surgery have either orthopedics (and traumatology) or neurosurgery backgrounds. What is not known are the standards of the residency programs training these surgeons. During the writing process, especially in the consensus meetings, the extended committee realized that the knowledge (as well as skills and attitude) basis of members from either of these specialties were very different, as discussed by Malempati et al.^[3] These different levels of knowledge were anticipated and expected in the headings of Spinal Deformity or Degenerative Spine Diseases but surprisingly, radical differences were present in the module of Basic Sciences as well. Based on this, graduation from a residency program of the aforementioned specialties could not be accepted as the only entry criteria but the criteria presented in the CC were developed. The levels adapted here are maxi-

malist as opposed to minimalist, that is, the 'desired' levels have been introduced as the entry levels. This is in line with the purposes of the CC as outlined above, with the hope that these desired levels may help defining the standards for spine training in the orthopedics and neurosurgery residency programs. It has to be noted at this stage that the development of a common curriculum for spinal surgery could only be possible by the joint efforts and a very high level of collaboration that had been achieved between the neurosurgeon and orthopedist members of our Spine Society.

There are several shortcomings of this CC and the development process. One is the arbitrariness as discussed above. Second, this CC was developed only for the surgeons involved in spine care, excluding other medical specialties/subspecialties such as but not limited to neurology, neuroradiology, physical medicine, physiotherapy, occupational therapy and others. This CC needs to be enriched by input from the relevant organizations of these disciplines.

Further, a CC must be recognized as a dynamic structure. The accuracy and completeness of the present proposal is not only discussable at the present time but definitely will be so in the future. Therefore, although the committee preparing the present CC had been formed specifically for this purpose on an *ad hoc* basis, our societies may be in need of permanent curriculum update committees.

In conclusion, this CC developed may form the basis of defining spinal surgery as a medical specialty and assist spine surgeons in developing better defined identities. Of note, this CC is only one of the probable alternative curriculums and also, by definition, will need to be reevaluated and modified as dictated by the needs of the future.

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(*) Appendices are available at www.aott.org.tr.