

INTERNATIONAL PERSPECTIVE

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If we look at the history of medical education within the United States and Canada, it becomes clear that the seminal changes which occurred as a result of Abraham Flexner's famous report¹ were strongly influenced by the systems of other countries. Men of learning in the mid- to late 1800s flocked to the universities of Austria, France, and especially Germany, to study science and medicine. Upon their return, they, and their subsequent students, began to significantly influence the educational systems of North America. Many regard Germany as the birthplace of the "scientific method" in medical education, and among those to assist in the delivery were famous scientists such as Robert Koch, Rudolph Virchow, and Paul Ehrlich. Here, microbiology, pathology, materia medica (pharmacology) and other disciplines were for the first time being defined as "the sciences basic to medicine". But all was not perfect. Even Flexner, in his comparison of medical education in Europe and the United States, noted that medical education in Germany was becoming more dominated by theoretical lectures. Patient contact and the integration of science and medical practice were, as he saw it, largely neglected.

Now, almost 100 years later, it seems an appropriate time to revisit the medical education system which was once so influential to North America. The author we have invited to accomplish this task is Dr. Wolfram Antepohl, who himself recently received an insider's view by obtaining his medical degree from the Christian Albrecht University in Kiel, Germany. Dr. Antepohl is now on staff at the University of Cologne, where currently he is implementing a Problem-Based Learning Curriculum in Pharmacology, one of the first such programs in Germany. We are proud that he is also a member of the IAMSE Board of Directors.

1. Flexner, A. 1910. *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching.*

MEDICAL EDUCATION IN GERMANY

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Institutions of Medical Education

Altogether, Germany has 35 medical schools, most of them part of large universities. Only one medical faculty (school) belongs to a private university, the University of Witten-Herdecke. On average, German medical schools have an acceptance rate of 288 medical students per school per year (1993). The total number of entering medical students in 1993/94 was 10,148. Differences between the medical schools concerning their curricula are not great, as the content and format are largely regulated by the State. Thus, German medical schools have few possibilities to develop their own profile. The freedom left within the medical schools, e.g., concerning additional electives, educational approach, and internal assessment, is often used very differently by the departments of any one medical school. Due to the department-oriented structure of German universities, it is often they who are responsible for "their" subjects in con-

trast to a more centralized structure where the entire faculty is responsible for curriculum design. It is thus possible that a course in one of the basic sciences becomes rather dominant over other subjects in one medical school, while in another, that same course plays hardly any role at all. At the same time, course quality within one medical faculty might vary greatly according to the dedication and creativity of staff from different departments.

The Present Curriculum

Medical education in Germany, in contrast to other university education, falls under the responsibility of the federal government and parliament. Its framework is defined in the *Approbationsordnung* (Medical Licensure Regulation), which was last changed in 1989. A new major revision is under discussion now and is expected to be

implemented in 1998 (see below). The medical curriculum in Germany is scheduled for a minimum duration of six years and three months or, in terms of hours, a minimum of 5,500 hours (as regulated in European Union law). It largely follows the traditional vertical (preclinical-clinical) and horizontal (by subject) subdivision and is divided into four semesters of preclinical education, two semesters of propedeutic clinical education, four semesters of course- and lecture-based clinical education, and a final practical year (see Table 1). It is important to note that, unlike in the United States for example, the big "division line" in German medical education so far still is drawn between "preclinical" and "clinical" sciences, with pathology and pharmacology being counted among the (so-called theoretical) clinical subjects. This may, however, change with the next revision of the *Approbatonsordnung*.

The preclinical semesters cover biology, chemistry, and physics (there is no premedical education in Germany), as well as the "classical" preclinical subjects of anatomy, biochemistry, and physiology. Furthermore, medical psychology and sociology are taught. In 1989, additional clinically-oriented seminars were introduced in anatomy, biochemistry, and physiology, in an attempt to bridge the gap between the clinical and the preclinical part of the curriculum. Teaching in the preclinical section occurs in lectures, practical courses where, for example, dissection and microscopy are taught, and in seminars where clinical aspects should be discussed in smaller groups of about 20 students. Subjects are mostly taught in parallel, i.e., lectures and courses in different subjects would take place on the same day. That is, a second-year class might for example one day spend two hours in a dissection course early in the morning, followed by two hours of biochemistry and physiology lessons. The afternoon might take them to the department of biochemistry for four hours of laboratory practice. Their schedule for the next day might start with lessons in anatomy, and so forth.

Some medical faculties or departments however, have meanwhile switched to teaching at least part of the syllabus in blocks, meaning that, for example, the first six weeks of a semester might be dedicated to anatomy lectures in the mornings and a dissection course in the afternoons, while the last eight weeks would be dedicated mainly to physiology.

The two preclinical years are followed by one year in which propedeutic elements, such as general physical examination and history taking, together with basic clinical-theoretical subjects, e.g., basic pharmacology, general pathology, and microbiology dominate. The lecture and course format is still most common here, but first patient contact eventually takes place in the course of clinical examination. In the fourth and fifth clinical year, "real" clinical subjects such as

internal medicine, surgery, etc. are taught, together with further theoretical subjects like clinical pharmacology and pathology or social and industrial medicine. Even here lectures stand for a large share of the time table. "Practical" teaching in the clinical subjects takes place in small groups of between three and eight (sometimes even more) students. The course of internal medicine for example, may consist of three hours per week for one semester, during which the small groups meet patients on wards and try to examine and discuss them together with a physician.

The sixth year, known as the practical year (*Praktisches Jahr*), does not consist of semesters, but rather is divided into three blocks of sixteen weeks each. Students in this final year do one subject per block: internal medicine, surgery, and an elective clinical subject. During these blocks, the students ideally work as part of the medical team in university or teaching hospitals. Under the supervision of physicians, they are expected to train clinical skills, as well as clinical thinking and decision making. After their graduation, young physicians in Germany must complete an additional internship (preregistration period, house officership) to become fully licensed.

Student Assessment

Basically, there are two different levels of assessment in German medical education. On the one hand, the departments usually perform in-course assessment, meaning they administer different kinds of exams (orals, practical exams, essays, MCQs...), during or after the courses for which they are responsible. Students must pass these exams in order to finish the course and receive a course certificate.

The second level of assessment in medical education is regulated by the government. The so-called State Exam (similar to the United States Medical Licensing Exam) is divided into four steps, one after each section of the curriculum.

The preclinical exam after the first two years is called *Physikum*, the exams after the other (clinical) sections are referred to as Step One (after the third year of the curriculum), Two (after the fifth year), and Three (after the sixth year) of the State Exam. To be admitted to these exams, students must have certificates from all departments in the section concerned, that is, they must have successfully passed all courses. The various steps have different elements: MCQs (multiple choice questions), oral, and practical examinations. While the *Physikum* consists of both MCQs (2/3 of the grade) and an oral part (1/3 of the grade), Step One only contains MCQs. Step Two again has MCQs and an oral examination, while Step Three only consists of a combined practical and oral part with no MCQs at all. The final grade for the graduate is a combined practical and oral part with no MCQs

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at all. The final grade for the graduate is a combination of the grades in all three steps.

The assessment method in Germany has been subject to major discussion. While it is undoubted that the MCQs are a very objective means of examination, more and more individuals doubt whether centrally produced MCQs are a valid instrument to measure a student's qualification to be a physician. Many students in preparing for the State Exams simply memorize questions and answers from old tests (which are published!) that are likely to reappear in one form or another on this licensure exam. On the other hand, the Federal Institute for Medical Exams attempts to reduce repetitions and thus their questions have become more specific; although they often seem far from the common ground of relevant medical knowledge. The coming revision of the *Approbationsordnung* (Medical Licensure Regulation) is thus also expected to contain changes in the examination procedures (see below).

Research in the Medical Curriculum

Research is not an obligatory part of medical education in Germany. Unlike the Anglo-American system, graduation from a medical faculty in Germany does not automatically confer the title of M.D.; although most students (about 70%) do a research project and write a thesis voluntarily in order to obtain this academic title. In principle, their research might range from a literature study to a three-year laboratory project. Some students do completely devote one or more semesters to the conduct of research, while others attempt to do it concurrently with their normal course of studies. Research merits, similar to graduation marks, have become a factor in the search for jobs, since unemployment is a recent problem for newly graduated physicians in Germany.

Application and Admission

With the number of applicants having declined over the last years (from 4.3 applicants per place in 1993 to 2.1 in 1996/97), rules for admission to medical education in Germany have recently been changed. Until the fall of 1996 there had been a central admission test, the results of which were combined with those of the secondary school degrees. But the government has recently implemented a new (which, in fact, is a very old) system. That is, 60% of the positions in medical schools will be allocated to applicants with the best grades from secondary school, while the remaining 40% of the places will be distributed according to a waiting list. Thus, medical schools have no influence on the selection of their students.

The Reform Discussion and Expected Reforms within the next years of medical education in Germany has been criticized from different sides and for various reasons throughout recent years. Major points of criticism are:

- lack of practical, patient-oriented training
- lack of both horizontal and vertical integration

- too much emphasis on more and more factual knowledge
- too little emphasis on global understanding
- antiquated teaching methods instead of more modern approaches such as problem-based and self-directed learning
- invalid assessment methods
- too much central regulation

Discussion regarding necessary reforms has thus been ongoing for quite some time. However, proposed initiatives have often been stalled because of the rigidity of the centralized system which does not permit much latitude for local experiments. Similarly, major reform at the national level was not achieved either, partly because of resistance from various lobby groups. Instead, small half-hearted programs were introduced, that would not harm anyone. Consequently, their positive effects were very limited as well. Only in the middle of the 1980s did a completely different curriculum take shape in the private medical school of Witten-Herdecke, initiated by the school's medical students and inspired by successful curricular reforms in other European countries and North America. Still, even Witten-Herdecke was limited by a number of federal regulations, especially concerning the centrally regulated student assessment system.

Horizontally integrated teaching will soon become obligatory.

Conclusions

The experiences from Witten-Herdecke, a number of smaller reform initiatives in other medical schools, and the growing pressure from students, politicians, and the public, helped to create an atmosphere in Germany that is now more open to reform. A new change in the federal *Approbationsordnung* (Medical Licensure Regulation) that is expected in 1998, will probably allow, for the first time, the implementation of experimental new curricula on a larger scale (plans exist, e.g., in Berlin and Munich). Furthermore, new learning methods, such as problem-based learning, are now appearing in the German curriculum, and integration is growing in importance. Horizontally integrated teaching will soon become obligatory. Clinical aspects will play a stronger role even in the first years, and the pre-clinical and first clinical phase will be joined together as one phase comprising the first five semesters. In all steps of the state exam, MCQs will be given less importance, while the weight of the oral and practical parts of the exam will be increased. Individual universities will have more possibilities to influence the MCQ questions. Concerning the clinical part, block courses and longer clinical attachments will be introduced. Finally, the number of admissions to medical schools will be reduced by 20% (i.e., from more than 10,000 students per year to about 8,000).

Even though the reforms now initiated by the federal government may be considered half-hearted and insufficient, they will at least sup-

ply those faculties willing to implement change with a chance to do so. Traditionalists might still be able to hide behind the new law, but for those ready to try a step towards the future, a new gate might open at last.

Table 1. Medical Education in Germany — The Standard Curriculum as Defined by Federal Licensure Regulation (*Approbationsordnung*)

<u>DURATION</u>	<u>EDUCATION</u>	<u>EXAMINATION</u>
4 years	Primary School	
9 (8*) years	Secondary School (<i>Gymnasium</i>)	final examination (<i>Abitur</i>) for general university admission, special test for admission to medical studies.
2 years (first and second academic year)	Preclinical Section: physics, chemistry, biology, physiology, biochemistry, anatomy, sociology, psychology, terminology; two months of nursing service (can be done before university studies)	in-course assessment premedical exam (<i>Physikum</i>): 320 nation-wide MCQs over two days; oral in two subjects
1 year (third academic year)	First Clinical Section: general pathology, general pharmacology and toxicology, microbiology and immunology, clinical chemistry and hematology, radiology, general physical examination and history taking, emergency cases and first medical aid, biometric methods, human genetics, history of medicine	in-course assessment Step One of medical state exam (<i>Erstes Staatsexamen</i>): 280 nation-wide MCQs over two days
2 years (fourth and fifth academic year)	Second Clinical Section: special pathology, special pharmacology, internal medicine, pediatrics, dermatology and venerology, surgery, orthopedics, urology, gynecology and obstetrics, ophthalmology, ENT, neurology, psychiatry, psychosomatic medicine and psychotherapy, emergency medicine, family medicine, ecological course (hygiene, industrial medicine, social medicine, forensic medicine) 4 months of clerkships during semester holidays (can even be started in the first clinical section).	in-course assessment Step Two of medical state exam (<i>Zweites Staatsexamen</i>): 580 nation-wide MCQs over four days;
1 year (sixth academic year)	Third Clinical Section, Practical Year (<i>Praktisches Jahr</i>) clinical attachments in surgery, internal medicine, and one elective subject; 16 weeks each in university hospitals or academic teaching hospitals	Step Three of medical state exam: oral and practical in the three subjects of the final year plus additional subject
1.5 years	Internship/House Officer/Pre-Registration Period (<i>Arzt im Praktikum</i>): supervised practical work in hospital or practice practice.	no examination
4-6 years	specialization in one of 46 specialties and subspecialties	specialist exam

*in the East German states of Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt, and Thuringia