

# The Redesigned Undergraduate Medical Curriculum at the University of Geneva

N.V. Vu, C.R. Bader, J.D. Vassalli

University of Geneva, Faculty of Medicine, Switzerland

## Summary

*The purpose of this paper is to give an overall description of the new undergraduate curriculum at the University of Geneva School of Medicine. Emphasizing the integrated problem-based and self-directed learning, the new program also incorporates instructional designs aimed at providing students with an opportunity to review and synthesize their biomedical and clinical knowledge, to have a more practical approach to the learning of clinical skills, and to learn aspects of the ambulatory and primary care as well as of the community oriented health issues. Preliminary results on the first year of implementation have led the faculty to anticipate with optimism the introduction of the next portion of the new program and to increase the size of its next entering class.*

## Introduction

Faced with the challenges of an ever changing medical training and practice, the undergraduate, graduate, and continuing medical education in Switzerland have been under scrutiny and continuous discussions among its medical schools, the Swiss Medical Association, and the responsible cantonal and federal education commissions. Similar to other countries, the Swiss undergraduate medical education has to face new challenges on how to prepare its future physicians to deal effectively with the continuous growing and changing medical knowledge, practice, and health care delivery and how to train and certify them in a relevant and effective manner. In answering those challenges it also needs to address and update the cantonal and federal ordinances which presently regulate its educational and certification systems, such as those on the open admission process in medical schools, or the criteria set for the certification process.

After a process of visits and reviews of various innovative curricula in the United States and Canada, the faculty of medicine at the university of Geneva has derived a proposal for changing its undergraduate medical curriculum. In 1992, its Assembly of Professors has voted to accept the proposed changes and to create a Unit of medical education to assist the faculty in all aspects of education and evaluation.<sup>1</sup>

Since its inception in 1994, the new Unit of medical education has worked with the Faculty in redesigning the medical curriculum. The new program incorporates both the requirements of the ordinance of the Swiss Medical Licensure Examination and the new educational principles adopted by the faculty.<sup>2</sup> These regulations and principles are to:

- Provide a general medical training to the students and to orient it towards community health care priorities.
- Integrate the teaching of basic, clinical, and psychosocial sciences.
- Promote an active and student-centered learning.
- Promote students' skills in problem analysis and solving, and in self-directed learning and self-evaluation.
- Emphasize students' early acquisition of clinical skills with a more practice-based learning.
- Implement relevant and adequate systems of student and program evaluation.

The new curriculum, implemented since Fall 1995, is designed to span from the second to the fifth year of the six-year curriculum. Presently, the first year is not included in the program because of the large and variable number of students enrolled in the first year and the sixth year, an elective year, remains unchanged as well.

The first entering class is a parallel track of 30 second-year students who are randomly selected among 57 volunteer-applicants who passed their first-year examination and completed the requirement of a 4-week apprenticeship as an assistant in patient care. It has been planned that within the course of a few years the new program will be progressively offered to the whole class of second- and third-year students. From a planification and management point of view, this gradual expansion to the whole class is not only realistic but necessary given the existing resources and organizational structures at our institution. For example, this would allow a year by year development and adjustments of the curriculum and of its teaching and testing programs. This would also facilitate a gradual training of faculty in the design of new educational materials, in teaching in small group tutorials, and in developing the student evaluation system, tasks which are relatively new for most members of our faculty. For these reasons, the fourth and fifth year clinical program, which will not be implemented until the Fall of 1997, is presently designed to accommodate the entire class, hence the students from both the traditional and PBL tracks.

## Program description

The second and third year curriculum consists of 16 integrated problem-based learning (IPBL) units, the longitudinal clinical and community oriented skills (CCOS) unit, and the immersion in the community unit. The fourth and fifth years consist of six

rotations of 11 clinical practice-based learning (CPBL) units preceded and followed by the Integration I and II units (Table 1).

## Second and third year program

The curriculum starts with a two-week "Introduction" unit where the students are introduced to all aspects of the learning and evaluation approaches of the new program. Following this unit, the first two years are divided into 15 *IPBL units* regrouped into four modules. A *module* consists of two or three four-week *system units* (i.e. Cell growth and aging, Nutrition and Digestion,...) with each covering seven to eight problems related to the systems, and a two-week *synthesis unit* placed at the end of most modules.

The biomedical concepts and the problems covered in each *IPBL unit* are proposed by the directors of each unit and its working group and are then reviewed, modified, and approved by the 2nd and 3rd year curriculum committee which regroups all the unit directors and representatives from different basic and clinical disciplines. The problems of each unit, based on real situations, are selected on the criteria that they should (a) bring the students to learn and integrate important basic sciences, clinical, and psychosocial concepts, (b) be a common or high priority problem and/or provide a good paradigm for learning the intended concepts, (c) facilitate the sequence in which students acquire related biomedical concepts, and (d) motivate students' learning. The processes for selecting the medical concepts and problems for each *IPBL unit* are further detailed in the article by Baroffio et al.<sup>3</sup>

Most modules end with a two-week synthesis unit which consists of three to four problems designed to help students revise and integrate the learning objectives from previous units. For example, one problem in the second module is a 72-year old female who presents with a history of long-standing arterial hypertension and symptoms of congestive heart failure and peripheral and pulmonary edema. The problem is designed to bring the students to understand the interplay between the cardiovascular and renal systems in the pathogenesis of sodium retention and edema in congestive heart failure. Based on the recent results on students' development and acquisition of medical knowledge, the synthesis unit is introduced in our curriculum as a newly designed instructional and learning unit.<sup>4-6</sup> Its purpose is to select and structure the problems so as to assist students in reviewing their previously learned basic sciences concepts, and integrating them into a network of interconnected biomedical concepts and mechanisms of disease. A detailed description of the synthesis unit is provided in the article by Perrier et al.<sup>7</sup>

In the *IPBL units*, students work and learn in groups of six to eight students with a tutor. The tutorial of each problem consists of two sessions. In the first session, students work on analysing and defining the problem; proposing, discussing, and integrating various possible explanations of the elements or phenomena observed in the problem; and deriving learning objectives for which they need to acquire further knowledge. After the first tutorial session, students have three to four half-days of self-directed learning before they come back for the second session where they bring their new knowledge to further explain or reexplain the problem. In addition to the tutorials, a two-hour

selected practical laboratory or lecture is scheduled per week to illustrate the biomedical concepts and mechanisms encountered in the problems.

Running parallel to the *IPBL units* in the second and third year, and the Integration I unit at the beginning of the fourth year is the newly designed *Clinical and Community Oriented Skills (CCOS)* unit. This unit consists of the clinical practice and the community-oriented skills programs. The *clinical practice skills program* provides the students with necessary skills to enter the clinical practice-based learning (CPBL) units in the fourth and fifth years. These skills include those of history-taking and physical examination, physician-patient relationship, patient education, technical skills, medical ethics, legal medicine, radiology and laboratory procedures, critical reading of the literature, and computer and library uses. The teaching of these skills is conducted in small groups, emphasizes practical learning, and is integrated to the theme and problems of the *IPBL units* whenever possible. A more detailed description of the clinical practice skills program is provided by Huber et al.<sup>8</sup>

The community oriented skills program regroups the community-oriented training and the community-based activities programs. The *community-oriented training* introduces students to various aspects of epidemiology and social and preventive medicine, as well as to the systems of community-based services and health care delivery. The *community-based activities* include first, a newly designed two-year program *introduction to ambulatory and primary care* conceived in partnership with the general practitioners, internists, and pediatricians in private practice in Geneva.<sup>9</sup> With the continuous evolution of the health care delivery system, the aims of this program is to introduce and sensitize students to various aspects of ambulatory, community, and primary care medicine.<sup>10</sup> In their second and third year, the students have regular monthly meetings with their assigned physician and get familiarized with all aspects of ambulatory medicine as well as with the follow-up of a patient in private practice. The community-based activities also involve students in a health network project and a in a four-week unit on immersion in community. In this unit, students learn first, to identify the priority health problems in Geneva, and to assess how and by whom these problems are managed. The unit is designed so that students have a direct access and contact with various community health care agencies and personal. A detailed description of the community oriented skills program is provided by Chastonay et al.<sup>11</sup>

## Fourth and fifth year program

The fourth and fifth year program, which will be implemented in fall 1997, is presently under development by the 4th and 5th year curriculum committee which consists of all the directors of the clinical practice-based units and representatives from basic and clinical disciplines. With the second and third year focusing on the students' ability to analyse problems and on their acquisition and integration of basic biomedical concepts and clinical skills, the fourth and fifth years focus more on students' acquisition and integration of clinical knowledge, and elaboration of clinical competence and problem-solving ability.

The *integration I* unit, placed at the beginning of the fourth year, is specifically designed to prepare students to enter the clinical practice-based learning units in the fourth and fifth year. The main objective of the unit is to help students further integrate the acquired basic sciences concepts, and to develop their clinical knowledge and problem-solving processes such as those in data collection and interpretation, diagnosis generation and evaluation, test ordering and interpretation, and elaboration of management plan. Again, based on the studies of students' development of medical knowledge, the integration I unit is introduced in our curriculum as a new instructional and learning unit with the intention to help students bridge the biomedical with the clinical knowledge and reasoning.<sup>4-6</sup>

To provide students with an adequate overall clinical training, the new clerkship or *clinical practice-based learning* year is divided into 6 compulsory rotation blocks of eight weeks in internal medicine, surgery, and pediatrics, four weeks in community medicine, psychiatry, obstetrics-gynaecology, and emergency medicine, and three weeks in ophthalmology, ENT, dermatology and neurology. The new program is characterized by the introduction of:

- a more practice- and situation-based learning aimed at students' acquisition of clinical knowledge and competencies in the context of frequent and common medical presentations of each discipline.
- a compulsory rotation in all the different clinical disciplines; it should be noted that until now, students are only required to do rotations in internal medicine, surgery, and pediatrics; rotations in others disciplines are optional.
- the newly designed clerkships in community and emergency medicine.
- a continuation of the self-directed learning process integrated in the clinical activities.

At the end of the clinical clerkship year, the integration unit II is designed to allow the students to review their clinical knowledge, to integrate it towards working up complex, multidisciplinary problems, and to review those topics which are covered on the federal certification examination.

## Student evaluation

Students' progression in the Swiss undergraduate medical schools is principally regulated by five federal examinations. In order to implement its new medical undergraduate curriculum, the Faculty of Medicine in Geneva has obtained in August 1995, from the Federal Department of the Interior, the permission to replace the federal certification process with an equivalent student evaluation process better adapted to the new curriculum.<sup>12</sup>

In the new program, the students are formally evaluated in the second and third year at the end of each module, and in the fourth and fifth year at the end of each integration unit and clerkship rotation. The exam content addresses the learning objectives intended in the learning units preceding the examination. Several assessment formats such as the written and oral examinations, newly designed practical examinations with standardized

patients as well as checklists and rating scales are used to evaluate students' knowledge, and their clinical and technical competencies. All test questions and practical exam stations are developed by the teachers responsible of the learning units, and reviewed afterwards by the committee on students' promotion and evaluation for their quality, relevance, and adequate content sampling and passing standard.

## Progress notes

A preliminary evaluation of the education and evaluation activities (such as curriculum committee functioning, faculty development, curriculum support structures, etc...) in the new curriculum and specifically of the second year program has been obtained at the end of our first-year implementation. For the purpose of this paper, only the evaluation of the second-year program is summarized here. Evaluations of the IPBL units, and of the tutors and the evaluation system are derived from three sources of data: the students' written and oral feedback and the faculty's oral feedback collected at the end of each IPBL unit and module, and the students' performance on the examinations. Overall, except for an early apprehension expressed by the tutors and the students, both have indicated they have enjoyed the process of teaching and learning respectively. As expected, the students had more difficulty in adjusting with the pace of work and the condensed schedule in the first than in the second module; this observation was in great part the result of a slight overloading of the problems in module 1 with too many intended learning objectives and readings. This preliminary feedback prompted the faculty to make several quick adjustments to the program by (a) downsizing the problems and their intended learning objectives, (b) giving more time between the end of a problem and the start of a new one instead of scheduling them back to back and (c) shortening the synthesis unit so to give students time to prepare for their module examinations. These minor adjustments resulted in a less overwhelming and more satisfying program for the students.

Except for one, all 59 tutors have received very satisfactory to excellent ratings from the students. In need for improvement, as both indicated by the students and the tutors, are the tutors' abilities to give more feedback to the students and to adjust their tutorial approach so as not too under or over intervening during the tutorial process, a task known not to be easy. In their first experiences with this new teaching approach, many tutors indicated that they enjoyed the tutorials but these latter did require a more extensive time in preparation and review. Their apprehension of being a basic scientist or a clinical tutor has progressively dissipated once they have gone through the tutorials.

Attempts (a) to provide students with an opportunity to review, synthesize and reason with their biomedical knowledge in the synthesis unit at the end of each module, (b) to have a more practical approach to the learning of clinical skills, and (c) to learn aspects of the ambulatory and primary care with town practitioners are very much appreciated and well rated by the students. A more detailed evaluation of these aspects can be found in separate reports.<sup>7 8 10</sup>

Students' performance of the two module examinations indicated that overall, most students have achieved the learning objectives set for the integrated problem-based learning (IPBL) and the clinical and community oriented Skills (CCOS) units. With a passing standard score set by the faculty at 54% and 69% for the IPBL and CCOS examinations respectively, it was found that for module 1 and 2 respectively, 82% and 96% of the students passed the IPBL exams and 85% and 92% passed the CCOS examinations.

These encouraging results and the active participation of the faculty in the development of the curriculum and in the teaching and evaluation of the students have led the faculty to anticipate with optimism the implementation of the third year program and to decide to double the size of its entering class in Fall 1996.

## References

1. Fulpius B, Bader C, Perrelet A. Etat d'avancement de la réforme des études de médecine à l'Université de Genève. *Revue Médicale de la Suisse Romande* 1994;114:83-5.
2. Ordonnance concernant les examens de médecin du 19 novembre 1980 - December 17, 1981 - RS 811.112.2 (Section 1, article 1).
3. Baroffio A, Giacobino JP, Vermeulen B, Vu NV. The new preclinical medical curriculum at the University of Geneva: Processes of selecting basic medical concepts and problems for the PBL learning units. In: Scherpbier AJJA, Van der Vleuten CPM, Rethans J-J, Van der Steeg AFW, editors. *Advances in Medical Education*. Dordrecht: Kluwer Academic Publishers, 1997.
4. Bordage G, Zacks R. The structure of medical knowledge in the memories of medical students and general practitioners: categories and prototypes. *Medical Education* 1984;18:406-16.
5. Patel VL, Evan AE, Groen GJ. Biomedical knowledge and clinical reasoning. In: Evans DA, Patel VL, editors. *Cognitive science in medicine: biomedical modeling*. Cambridge, MA: MIT press, 1989.
6. Boshuizen HPA, Schmidt HG. On the role of biomedical knowledge in clinical reasoning by experts, intermediates, and novices. *Cognitive Science* 1992;16:153-84.
7. Perrier A, Dunant Y, Ferrero J, Vu NV. The synthesis unit: A complementary approach to integration in a problem-based learning curriculum. In: Scherpbier AJJA, Van der Vleuten CPM, Rethans J-J, Van der Steeg AFW, editors. *Advances in Medical Education*. Dordrecht: Kluwer Academic Publishers, 1997.
8. Huber P, Perrier A, Balavoine JF, Archinard M, Lefebvre D, Vu NV. Design and development of the new preclinical practice skills (CPS) program at the University of Geneva. In: Scherpbier AJJA, Van der Vleuten CPM, Rethans J-J, Van der Steeg AFW, editors. *Advances in Medical Education*. Dordrecht: Kluwer Academic Publishers, 1997.
9. Vu NV. Cliniciens-Praticiens: Partenariat dans le nouveau programme d'études médicales à Genève. *Ars Medici* 1996;10:607-8.
10. Mottu F, Lefebvre D, Klauser P, Stalder H, Vu NV. Le stage de compétences en médecine ambulatoire. *Ars Medici* 1996;10:608-12.
11. Chastonay P, Stalder H, Mottu F, Rougemont A, Perneger T, Morabia A, et al. Community health issues of the new PBL preclinical medical curriculum at the University of Geneva: A description. In: Scherpbier AJJA, Van der Vleuten CPM, Rethans J-J, Van der Steeg AFW, editors. *Advances in Medical Education*. Dordrecht: Kluwer Academic Publishers, 1997.
12. Ordonnance concernant le test d'un modèle spécial d'enseignement et d'examens à la Faculté de médecine de l'Université de Genève - August 25, 1995 - RS 811.112.22.