The New Preclinical Medical Curriculum at the University of Geneva: Processes of Selecting Basic Medical Concepts and Problems for the PBL Learning Units

A. Baroffio, J.P. Giacobino, B. Vermeulen, N.V. Vu

University of Geneva, Faculty of Medicine, Switzerland

Summary

On October 1995, the medical faculty of the University of Geneva has started a new second and third years preclinical curriculum. It consists of 16 integrated "Problem-Based Learning (PBL) Units". The first "Introduction" Unit of 2 weeks is aimed at introducing students with the PBL technique. Eleven PBL Units each of one month duration, comprise of 7 to 8 problems with themes related to important body functions or organ. Finally 4 Synthesis Units, each of 2 weeks duration, and following 2 to 3 PBL Units, comprise 4 problems aimed at integrating concepts common to preceding Units. The elaboration of such a new PBL curriculum requires to address two main issues, namely 1) how to select the important basic medical concepts and relevant problems leading to the learning objectives of each learning Unit and 2) how to verify the quality and relevance of the designed problems. This paper is aimed mainly at describing the steps followed in Geneva to solve these issues. First, it will present the process of selecting the basic science concepts, designing the problems and establishing their sequence. Second, it will describe the process of verifying whether problems fit to the identified concepts, lead to learning objectives and reach the appropriate level of learning for the students.

Introduction

In October 1995, the University of Geneva Faculty of Medicine has initiated a new curriculum, based on Problem Based Learning (PBL). This curriculum extends from the second to the fifth year, the first year being unchanged because of the large number of students involved, and the sixth year, an elective year, remaining unchanged as well. The preclinical years (second and third) are organized in 16 PBL Units, the themes of which are related to important organs or body functions. Within each Unit, problems have been designed in order to lead the students into the study of the most important basic medical concepts.
In the elaboration of such a PBL curriculum, several main issues must be addressed:
- the selection of the important basic medical concepts,
- the design of the problems leading to the identified learning objectives,
- the verification of the quality and relevance of the designed problems.

This paper is aimed at describing the steps followed in Geneva to resolve these issues.

Description of the curriculum

A general description of the curriculum is presented in a paper by Vu et al.[1] Moreover, specific aspects of the new curriculum such as the preclinical practice skills unit, the new concept of a synthesis unit and the community heath issues are presented in other papers.[2-4] Only the PBL section of the second and third years curriculum will be described here.
The second and third years curriculum consists of 16 "Problem Based Learning (PBL) units". The quite first Unit, "Introduction", precedes the first Module, lasts 2 weeks and has for main objective to introduce the curriculum and the PBL approach to learning. The other 15 Units are grouped into 4 Modules, according to the themes of the Units. Each Module is composed of 3 to 4 Units. The Units of the first Module are: "Cell growth and Aging", "Nutrition and Digestion", "Reproduction", and "Synthesis Module 1", a Unit aimed at integrating and reviewing concepts acquired during the three preceding Units.[3] The Units of the second Module are: "Circulation", "Excretion and Homeostasis", "Respiration" and "Synthesis Module 2". The Units of the third Module are: "Perception and Motor control", "Behaviour and Communication", "Locomotion" and "Synthesis Module 3". Finally the Units of the fourth Module are: "Infections", "Defences and Immunity", and "Synthesis Module 4". The PBL Units of each Module last one month and contain 7 to 8 problems. The Synthesis Units last 2 weeks and contain 3 to 4 problems.
The program of each Unit integrates not only small group tutorials on the designed problems and self-directed learning, but also a few practical laboratories or integrative lectures in relation to the problems of the Unit and a parallel "Clinical Practice Skills" Unit.[2]

Elaboration of the general content of the learning units

As a first step, the Education Committee defined the themes of the learning Units as well as their sequence. This will describe the procedures that were used in Geneva in order to define the general content of each learning Unit, as well as the basic medical concepts to be studied.[5] In order to perform this task, a Committee was created, the second and third years curriculum Committee.
The objectives of this Committee were to: 1) ensure that all important biomedical concepts were integrated in the new program, 2) verify an horizontal coordination of the 16 learning

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Units, and 3) coordinate the various activities of each Unit (PBL, practical laboratories, integrative lectures, Clinical Practice Skills Unit).

Therefore the Committee was composed of all directors of the learning units and of representatives of basic and clinical sciences disciplines. The function of the directors of learning Units was to ensure that all important and relevant medical concepts related to the theme of the Unit are covered in the program and of the representatives of disciplines to ensure that all important medical concepts related to its discipline are taught in the new curriculum. By integrating the propositions of both groups and obtaining a consensus when necessary, a preliminary content for each Unit was proposed as well as suggestions about the types of problems that could be written. Based on several reviews of the content of the 16 Units and identification of missing or redundant concepts, a general content for each learning Unit was finally adopted.

Elaboration of the problems for each learning unit

Once the general content was identified, each learning Unit had to elaborate its problems. This phase of the program was performed in working groups for each Unit. The working objectives were 1) to identify the specific content of the Unit, i.e. the detailed biomedical concepts belonging to the subject of the Unit, and 2) to design 8 problems that would lead to the identified learning objectives. The Unit working groups were composed of 10 to 15 members belonging to different clinical and basic sciences disciplines. Members of the working group had to ensure that clinically relevant basic medical concepts were presented in the problems. When each problem had been designed to fit the learning objectives, a sequence of the 8 problems within the Unit could be proposed. At that point, the program of each Unit returned to the second and third years curriculum Committee for review, verification and coordination.

Verification of the problems

The second and third years curriculum Committee was in charge of verifying the problems of each Unit. The points that needed verification were the following:

- Did the problems cover the defined content of the Unit?
- Did the problems and their learning objectives integrate longitudinally across Units, in terms of level of knowledge required, timing of presentation of the concepts, missing concepts in order to elaborate on the problem?
- Was the proposed sequence of the problems within the Unit adequate?
- Did the text of the problem fit its learning objectives?
- Were the chosen references adequate with respect to the learning objectives?
- Was the time for self-directed learning (evaluated as the number of textbook pages to be read and understood) adequate?

This verification process led to concrete modifications of both the text of the problems and of their learning objectives. These changes were implemented by the working group of the learning Unit. The modified version was reviewed a second time by the Committee which finally gave agreement to the publication of the final program of the Unit for the students.

Evaluation of the curriculum after the first year of implementation

At the end of each Unit, students fill out an evaluation form, in which they evaluate various aspects of the Unit. Particular points, related with the preclinical program, are investigated to determine whether:

- The problems are clearly written and adequate for PBL
- The problems favour the acquisition and integration of the various disciplines
- The problems stimulate discussions
- The practical laboratories help understanding some concepts in the problems
- The relation between basic and clinical sciences is established
- The references are adequate
- The time for self-directed learning is sufficient
- The matter presented in the Unit is adapted to students' previous knowledge
- Students learn a lot
- Students appreciate the theme of the Unit

These points were rated by the 30 students of the first cohort, from 1 (I do not agree) to 5 (I completely agree). In addition a global rating of the Unit was asked, that could be 1 (excel lent), 2 (good), or 3 (could be better).

In order to get an idea of the points that have to be improved, the mean ratings for each question across the 8 Units of the second year ("Introduction" is not included) are summarized in Table 1. With these results, individual variations between Units are not taken into account, since our objective is to get a first indication of the strong and weak points of the program.

It can be deduced from these preliminary results, that the global evaluation of the curriculum by the students is good. However, it raises a major problem, namely that the time for self-directed learning is not sufficient with respect to the learning objectives of the Units, and a less important criticism, namely that the references are not always adequate. Concerning all the other points that have been evaluated, the students did not have major criticisms. On the other hand, the global ratings of the Units ranged from 1.9 to 1.5, indicating a good to good-excellent rating of the Unit content and program.

Taking into account the students' propositions, working groups of the second year Units are currently modifying their content, and especially trying once more to determine the really most important concepts, and to escape the tendency to "coveritis". This new version will be again evaluated by the second and third years curriculum Committee, before a revised version of the second year program will be proposed to the new cohort of students starting on Fall 1996.

Table 1: Mean, minimal and maximal ratings of the 8 Units of the second year curriculum based on the evaluation forms filled by the 30 students of the first cohort.

Question	Mean	Minimum	Maximum
The problems are clearly written and adequate for PBL	4.4	3.7	4.8
The problems favour the acquisition and integration of the various disciplines	4.4	4.0	4.8
The problems stimulate discussion	4.6	4.4	4.9
The practical laboratories helped understanding the matter	4.4	3.9	4.6
The relation between basic and clinical sciences was clear	4.4	4.3	4.6
The references were adequate	3.8	3.6	4.3
The time for self-directed learning was sufficient	3.1	1.9	3.7
The matter presented in this Unit was adapted our previous knowledge	4.3	3.8	4.9
I learned a lot	4.7	4.6	5.0
I appreciated the theme of the Unit	4.7	4.6	5.0
Global rating	1.8	1.5	1.9

Conclusion

The procedures followed in Geneva for selecting the important medical concepts, designing the problems and verifying their quality, present several advantages:

- ensuring that all the important medical concepts identified by each individual discipline are covered in the new curriculum
- vertical and horizontal integration of the 16 learning Units of the second and third years curriculum
- verification of the quality and relevance of the problems by representatives of the clinical and fundamental disciplines

However, this procedure, although efficient, must be completed by an evaluation of the program by the students. Only experience can really lead to an improvement of the curriculum. This phase has now started in Geneva.

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