COMBINATION OF DIDACTIC LECTURE
WITH PROBLEM-BASED LEARNING SESSIONS
IN PHYSIOLOGY TEACHING IN A
DEVELOPING MEDICAL COLLEGE IN NEPAL

Sarmishtha Ghosh and Violet Dawka

Manipal College of Medical Sciences, Pokhara, Nepal

Physiology teaching as an essential part of medical education faces tremendous criticism regarding curriculum design, methods of implementation, and application of knowledge in clinical practice. In the traditional method of medical education, physiology is taught in the first year and involves little interdisciplinary interaction. The Manipal College of Medical Sciences, Pokhara, Nepal (affiliated with the Kathmandu Univ.) started in 1994 and adopted an integrated curriculum drawn along the lines of the student-centered, problem-based, integrated, community-based, elective-oriented, and systematic (SPICES) medical curriculum. Here, physiology is taught for the first 2 yr of the 4.5-yr Bachelor of Medicine, Bachelor of Surgery course. Methodology adopted is as follows. For a particular topic, objectives are clearly defined and priority content areas are identified. An overview is given in a didactic lecture class to the entire batch of 100 students. Tutorial classes are conducted thereafter with smaller groups of students (25/batch) divided further into five subgroups of five students each. In these sessions, a problem is presented to the students as a focus for learning or as an example of what has just been taught. Each problem was accompanied with relevant questions to streamline the students’ thought processes. A tutor is present throughout the session not as an instructor but as a facilitator of the learning process. A questionnaire sought students’ opinion on the usefulness of this approach, relevance of the combination of problem-based learning (PBL) sessions and didactic lectures in understanding a particular topic and relating clinical conditions to basic mechanisms, and improvement of performance on the university final examination. The majority of the students opined that the combination of didactic lectures and PBL sessions was definitely beneficial regarding all the above-mentioned aspects of learning. The university results corroborated their opinion. Thus it may be considered that a judicious mixture of didactic lectures and PBL sessions is beneficial as a teaching module of physiology in medical schools.

ADV PHYSIOL EDUC 24: 8–12, 2000.

Physiology, a highly dynamic science, is based on functional thinking. For centuries it has been regarded as the only recognized basic biomedical science. Recently, newer biomedical sciences like biochemistry, genetics, molecular biology, and neurosciences have come up, and the overlap is so exten-
sive that it is practically impossible to demarcate the boundary of each. In the traditional method of medical curriculum, physiology is taught in the first year of the course and involves little interdisciplinary interaction. However, recently, most of the medical schools have adopted a student-centered, problem-based, integrated, community-based, elective-oriented, systematic (SPICES) medical curriculum (2). In this curriculum, physiology is taught along with the other basic sciences for the first 2 yr of the course and demands strict interdisciplinary interaction.

The Manipal College of Medical Sciences, Pokhara, the newest addition to the family of the Manipal Education and Medical Group, India, is affiliated with the Kathmandu University and follows the SPICES model of medical curriculum. The objective of this curriculum is to produce a well-rounded medical graduate who, on completion of the 5.5-yr undergraduate medical program, will develop clinical skills to diagnose and manage health problems of his or her patients with a touch of competency, versatility, and professional attitude.

Physiology teaching as an essential part of medical education faces tremendous criticism regarding curriculum design, methods of implementation, evaluation systems, and application of the knowledge in clinical practice.

AIM

Because we were given an already-designed medical curriculum and the teaching of physiology needed a strict interdisciplinary interaction, the aim of the present study was to try and evolve systems of teaching and learning so that the students could adopt a problem-solving approach by applying the concepts and principles of physiology to clinical problems (1). It was also aimed at finding out whether a judicious mixture of the didactic lectures and problem-based learning (PBL) sessions would be a better option for making the students understand the physiological concepts related to clinical cases.

METHODS AND STRATEGIES

This study was performed on the fourth batch of students, who were in the third semester studying the endocrine system at the time the study was being performed. The entire batch consisted of 100 students from different countries. First, didactic lectures on a particular topic were taken. The batch was then divided into smaller groups of 25 each, and tutorial classes were conducted for them. Each small group of 25 came to the class 1 day every week. Every day that these 25 students turned up, they were further subdivided into five groups of five students each. There were absentees, but they were not regular absentees, so they underwent the same training in class at some point.

Each batch was given a clinical problem in which the symptoms of a particular endocrinological disorder were made very clear, and some questions were given following the said problem. This was done to ensure that students who had just entered medical school will think in an organized fashion. The problems are brief, correctly formulated, and framed in such a way that they matched the students’ level of previously acquired knowledge (4, 5). One such problem is given below as an example:

A 36-yr-old woman complains of a 15-lb weight gain in 1 yr, amenorrhea for 6 mo, fatigue, difficulty in remembering phone numbers and “being slowed up” mentally, a lower voice, and constipation. Physical examination showed she has a puffy face and cool dry skin temperature (35°C), pulse 56, blood pressure 120/85. Her thyroid gland was firm, lobular, and nontender. Tendon reflexes are slowed with a delayed return phase.

Laboratory data: serum T4 is 2.5 μg/dl (8 μg/dl), FT4I 2.4 (4.5–11), serum TSH is 8 μg/ml (0.5–5 μg/dl), prolactin is 45 ng/ml.

Discuss the case with reference to the following questions:

1. What are the clinical features of this patient suggestive of?

2. What does this case indicate—a primary or a secondary one? Which laboratory test confirms the fact? Would a head scan be indicated?

3. Which is the most likely cause of her abnormality in the affected gland?

4. What is the normal mechanism of the functioning of the said gland?

5. How is the secretion from this gland regulated?
6. What are the possible causes of a reduced production?

7. How do you expect to treat this individual?

The students were given enough time to study the particular problem with reference to the accompanying questions. They discussed among themselves and followed the basic textbooks of physiology and biochemistry and some books of clinical medicine depending on what was the case given. They finally arrived at some conclusion regarding the answers to the questions. A tutor was present throughout the class. He went around from table to table to each of the five subgroups and facilitated the learning process of each student (3). The tutor does not instruct as to how to solve the questions or where in the book they will find the relevant answers. He just streamlines the thought processes of the students by discussing the answers to which the students have arrived and clarifying if there is any controversy regarding a question. There is the possibility of some students hiding and not participating in the program. But because the batch of 25 was further subdivided, it was easy for the tutor to keep an eye on almost all of them and force them to work. Despite this effort, 1–3% still hid, and these were the students who stated that the PBL sessions were not useful.

After the tutorial classes on the whole of the endocrine system were over, the students were given a questionnaire about their opinions.

**QUESTIONNAIRE**

The questions were framed in such a way that yielded responses regarding

**TABLE 1**

Response of students regarding the usefulness of didactic lectures, PBL in the physiology tutorial classes, and a judicious mixture of both in the context of understanding the system they are currently studying

<table>
<thead>
<tr>
<th></th>
<th>Very Useful</th>
<th>Useful</th>
<th>Not Useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didactic lecture</td>
<td>34</td>
<td>58</td>
<td>08</td>
</tr>
<tr>
<td>PBL (physiology tutorial)</td>
<td>51</td>
<td>45</td>
<td>04</td>
</tr>
<tr>
<td>Didactic lecture + PBL</td>
<td>80</td>
<td>13</td>
<td>07</td>
</tr>
</tbody>
</table>

Number of responses, 100. PBL, problem-based learning.

**TABLE 2**

Response of students regarding the relevance of PBL in the physiology tutorial classes and a mixture of didactic lecture and tutorial in the context of relating the clinical condition to the basic mechanism

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>To Some Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBL (physiology tutorial)</td>
<td>75</td>
<td>01</td>
<td>24</td>
</tr>
<tr>
<td>Didactic lecture + PBL</td>
<td>80</td>
<td>07</td>
<td>13</td>
</tr>
</tbody>
</table>

Number of responses, 100.

- usefulness of didactic lectures, PBL in Physiology tutorial classes, and a judicious mixture of both in the context of understanding the system they are currently studying (Table 1)

- relevance of PBL in physiology tutorial classes and didactic lecture + physiology tutorial classes in the context of relating the clinical condition to the basic mechanism (Table 2)

- whether there had been valuable exchange of ideas in small-group discussions in the tutorial classes and whether this would improve their performance in the university examination (Table 3)

- A sample of the questionnaire along with responses asked for is enclosed as APPENDIX.

**CONCLUSIONS**

Eighty percent of the students were of the opinion that a judicious mixture of the didactic lecture and PBL in the physiology tutorial classes were very useful in understanding the system that they were currently studying. Only 7% felt that this combination was not useful. Perhaps this group was comprised of students

**TABLE 3**

Response of whether students had valuable exchange of ideas in small-group discussions in the physiology tutorial classes and whether this would help them to perform better on the university examinations

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>To Some Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange of ideas</td>
<td>61</td>
<td>04</td>
<td>35</td>
</tr>
<tr>
<td>Better performance on university examination</td>
<td>66</td>
<td>03</td>
<td>31</td>
</tr>
</tbody>
</table>

Number of responses, 100.
who hid from the schedule and did not participate actively in the process. More than 60% felt that small-group discussions led to better exchange of ideas and may help them to perform better in the final examination. More than 70% of the students opined that the physiology tutorial classes were helpful in the context of relating the clinical condition to the basic mechanism.

This batch had their final university examination in basic sciences in December 1999, and their results were as follows: the test was 100 marks for theory and 50 marks for practical. Of the 100 students, 37 got distinctions (>113/150), 15 students got below 100, and the remaining 48 got 110–112. This is definitely a good result compared with the previous batch, in which there were only five distinctions and the majority of the students were in the range of 55–75%.

So the students who opined that this training will help them to perform better in university were right in putting forward their views. There has been, in fact, an improvement in the university results.

**SUMMARY**

Physiology emerges as a distinguished scientific discipline by its emphasis on homeostatic mechanisms at all levels of organization and its thorough understanding in the study of medicine and pathology. There is no single method of teaching that can ensure thorough understanding of a topic among the students. However, a judicious mixture of didactic lectures and PBL sessions in the tutorial classes may be considered to be important in that it may

- motivate the students toward self-directed learning
- give them a defined objective along the line of which they will be able to have a constructive approach to apply principles of pathophysiology to various clinical conditions

This will ultimately be beneficial for their entry into the clinical phase and finally patient management.

After declaration of their university results, it was observed that this batch performed better compared with the previous batches when the PBL sessions were not combined with didactic lectures in physiology.

**APPENDIX**

Please encircle your answer.

1. In understanding a particular topic, didactic lectures are
   a. Very useful  b. Useful  c. Not useful

2. In understanding a particular topic, PBL sessions are
   a. Very useful  b. Useful  c. Not useful

3. The problems given in the physiology tutorial classes are in the context of the system currently studied
   a. Very useful  b. Useful  c. Not useful

4. In PBL sessions, valuable exchange of ideas take place in group discussions
   a. Yes  b. No  c. To some extent

5. In physiology tutorial classes, valuable exchange of ideas take place in group discussions
   a. Yes  b. No  c. To some extent

6. During PBL sessions, tutor guidance is
   a. Not required  b. Helpful  c. Not helpful

7. During our PBL sessions, tutor guidance was
   a. Adequate  b. Not adequate  c. Adequate to some extent

8. By virtue of the PBL sessions, clinical conditions could be better related to the basic mechanisms.
   a. Yes  b. No  c. To some extent

9. By virtue of the problem-based physiology tutorial classes, the understanding of the subject/topic was better.
   a. Yes  b. No  c. To some extent

10. All PBL sessions should be preceded by didactic lectures on the system from all departments of the basic sciences. This will be helpful in better understanding topic and to relate clinical conditions to basic mechanisms.
    a. Yes  b. No  c. To some extent

11. Do you think that the training in the PBL sessions helped you to perform better on the university examination?
    a. Yes  b. No  c. To some extent

12. Do you think that the training in the physiology tutorial classes will help you to perform better in the university examination of this subject?
    a. Yes  b. No  c. To some extent
13. Do you feel that there should be judicious mixture of didactic lectures and PBL sessions for a better understanding of a particular system and associated clinical conditions?
a. Yes  b. No  c. To some extent

Address for reprint requests and other correspondence: S. Ghosh, Dept. of Physiology, Pramukhswami Medical College, Karamsad-388325, Anand, Gujarat, India (E-mail: sarmishtha@yahoo.com).

Received 4 June 1999; accepted in final form 19 September 2000

References