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An innovative medical education program was begun in 1988 with 19 students as the first group. The curriculum consisted of integrated preclinical and clinical sciences studies for the entire five-year course along with community-targeted, problem-based learning experiences, which stressed self-direction. Phase I was conducted for 2 1/2 years at the Faculty of Medicine, Chulalongkorn University; it stressed knowledge of basic medical sciences. Phase II also lasted for 2 1/2 years; it emphasized clinical knowledge and was conducted at the Air Forces's Bhumiphol Adulyadej Hospital. Since this is the first time such a curriculum has been introduced in Thailand, many parties are interested in knowing if the graduates of this medical program acquired as much knowledge of basic medical sciences as did graduates who have gone through three years of preclinical and three years of clinical sciences in a conventional program. By using 150 multiple choice questions on basic medical sciences from a test used by the Medical Council for licensing foreign medical graduates to practice in Thailand, we tested and analysed the scores obtained by the students at the end of Phase I of the innovative program and found that the arithmetic means was less than that of the students at the end of their fourth year a conventional courses, but there was no difference at the end of Phase II. It was concluded that the students in the innovative program had acquired the same level of knowledge in basic medical sciences at the end of their curriculum that students in the conventional program had obtained at the end of their preclinical studies, based on the fact that their average test, scores were the same.

Key words : *Basic medical sciences, Community Oriental Program, Preclinical assessment, Achievement.*

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มาลี พูลคลองตัน, เฉลิม วราวิทย์, สมศักดิ์ วรรธนะภัฏ. ความรู้พื้นฐานทางวิทยาศาสตร์การแพทย์ของนิสิตแพทย์โครงการการศึกษาแพทย์แนวใหม่รุ่นแรก. จุฬาลงกรณ์เวชสาร 2536 สิงหาคม; 37(8) : 515-521

โครงการการศึกษาแพทย์แนวใหม่เริ่มเปิดรับนิสิตรุ่นแรกในปีการศึกษา 2531 จำนวน 19 คน หลักสูตรของโครงการมีลักษณะบูรณาการเนื้อหาวิชาทางปรีคลินิกและคลินิกให้ผสมผสานกันตลอดเวลา 5 ปี โดยใช้ชุมชนเป็นเป้าหมาย รูปแบบการจัดประสบการณ์การเรียนรู้ใช้ปัญหาเป็นหลัก เน้นการฝึกให้นิสิตแสวงหาความรู้ด้วยตนเอง การศึกษาระยะที่ 1 ในช่วงแรกใช้เวลา 2 ปีครึ่ง ที่คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย จะเน้นความรู้พื้นฐานทางวิทยาศาสตร์การแพทย์ส่วนการศึกษาระยะที่ 2 ในเวลาอีก 2 ปีครึ่ง จะเน้นภาคคลินิกอยู่ที่โรงพยาบาลภูมิพลอดุลยเดช กรมแพทย์ทหารอากาศ ด้วยเหตุที่หลักสูตรรูปแบบนี้เพิ่งเกิดขึ้นในประเทศไทยจึงเป็นที่สนใจของผู้เกี่ยวข้องหลายฝ่ายว่าแพทย์จบหลักสูตรนี้จะมีความรู้พื้นฐานทางวิทยาศาสตร์การแพทย์มากน้อยเพียงใดเมื่อเทียบกับแพทย์หลักสูตรปกติซึ่งเรียนวิชาทางปรีคลินิกใน 3 ปีแรก และเรียนคลินิกใน 3 ปีหลัง คณะผู้วิจัยจึงสำรวจข้อมูลความรู้พื้นฐานทางวิทยาศาสตร์การแพทย์ของนิสิตโครงการฯ เมื่อผ่านการศึกษาระยะที่ 1 และ 2 พร้อมทั้งเก็บข้อมูลเช่นเดียวกันจากกลุ่มนิสิตแพทย์จำนวน 34 คน ซึ่งสุ่มตัวอย่างจากนิสิตชั้นปีที่ 4 ปีการศึกษา 2533 ด้วยวิธีใช้แบบสอบชนิดเลือกตอบที่มี 5 ตัวเลือก จำนวน 150 ข้อ ซึ่งคัดเลือกจากชุดข้อสอบของแพทยสภาที่ใช้เพื่อการสอบขอใบอนุญาตประกอบวิชาชีพเวชกรรมในประเทศไทยข้อสอบชุดนี้ประกอบด้วยเนื้อหาวิชาวิทยาศาสตร์พื้นฐานทางการแพทย์เท่านั้น ผลการเปรียบเทียบค่ามัชฌิมเลขคณิตคะแนนสอบของกลุ่มตัวอย่างพบว่าค่ามัชฌิมเลขคณิตคะแนนสอบของนิสิตแพทย์โครงการ ฯ เมื่อผ่านการศึกษาระยะที่ 1 มีค่าน้อยกว่าของนิสิตแพทย์ชั้นปีที่ 4 แต่ไม่มีความแตกต่างกันเมื่อผ่านการศึกษาระยะที่ 2 แสดงว่านิสิตแพทย์โครงการ ฯ มีการพัฒนาความรู้ในระหว่างการศึกษาทำให้คะแนนเฉลี่ยไม่มีความแตกต่างจากคะแนนเฉลี่ยของนิสิตแพทย์ ซึ่งผ่านการศึกษาภาคปริคลินิกของหลักสูตรปกติ

The Community-Targeted, Problem-Based Curriculum (CTPB) was first developed in Thailand in 1988 at the Faculty of Medicine, Chulalongkorn University. The curriculum was launched by Chulalongkorn University in cooperation with The Royal Thai Air Force. It offers a five-year curriculum for bachelor's degree graduates who have earned 26 credits in basic sciences. The program consists of two phases. The first phase requires two and a half years for 10 blocks of study at Chulalongkorn University in integrated basic and clinical sciences as well as community medicine. The second phase at Bhumiphol Adulyadej Hospital emphasizes clinical sciences as well as some basic sciences and community medicine for another two and a half years. The aim of this program is to produce physicians with knowledge and skills who are competent in problem-solving, critical thinking and self-directed learning ability so that they will be able to perform effectively and efficiently in the health care system.

Since the first group of students in this innovative program were graduated as Doctors of Medicine in 1993, it seems appropriate to analyse their knowledge of basic medical sciences in order to determine the strengths and weakness as of these graduates as well as to assess the achievement which would be valuable for the purposes of adjustment and standardization of the curriculum.

Objective

Study the data on basic medical knowledge to analyse the strength and weakness of the graduates which will benefit the development and adjustment of curriculum.

Materials and methods

Knowledge of basic medical sciences was assessed in two groups : 19 students who were taking innovative medical studies, and 34 fourth-year students taking conventional courses in the 1990 academic year. These 34 students were selected by simple randomized sampling from the entire class of 97 medical students.

Data were collected twice to compare basic medical knowledge of innovative medical students and conventional students after preclinical years while the latter studying in the first semester of fourth year, by answering the same test. The first collection was performed at the end of Phase I in August 1990 from the students in the innovative program and the fourth-year students taking conventional courses. The second collection was performed at the end of Phase II in March 1993. A total of 150 multiple choice questions on basic medical sciences were selected from the Thai Medical Council test used for licensing foreign medical graduates to practice in Thailand. These question represented a body of knowledges that would qualify successful examinees as having attained a standard of knowledges that meant that they could practice medicine in Thailand. It consisted of 25 questions on community medicine, 24 questions on microbiology, 18 questions on biochemistry, 16 questions on epidemiology; 15 questions on pharmacology, and laboratory 11 questions each on pathology and laboratory medicine, and 10 questions each on anatomy, parasitology and physiology. The Student's test was used to determine the significance of any difference between the arithmetic means of the two samples.

Results

The arithmetic means of the scores of the two groups of students at the end of Phases I and II another comparing to the conventional students, according to the curriculum structure as diagram. (Diagram 1) Those of the students in phases I and II of the innovative program were different ($t = -2.485$, $P<0.05$) and those of students in phase I of the innovative program and those in the third year of the conventional program were different ($t = -5.951$, $P< 0.001$). However, a comparison of the students at the end of phase II of the innovative program with those of the third-year students in the conventional program showed that there was no difference ($t = -0.081$, $P< 0.05$), as may be seen in table 1. This demonstrate that medical students in the innovative program acquired a greater knowledge of basic medical sciences with an average score equal to that of fourth-year students who went through all the basic medical sciences subjects in their pre-clinical years of the conventional program.

Table 1. Statistics Describing Basic Medical Sciences Scores of CTPB and Conventional Students.

Samples	N	Range	Mean Score	Standard Deviation
CTPB 1st exam	19	55-78	64.21	6.29
4th Yr. Medical Students exam.	34	66-101	77.03	7.94
CTPB 2nd exam.	19	65-90	77.21	6.90

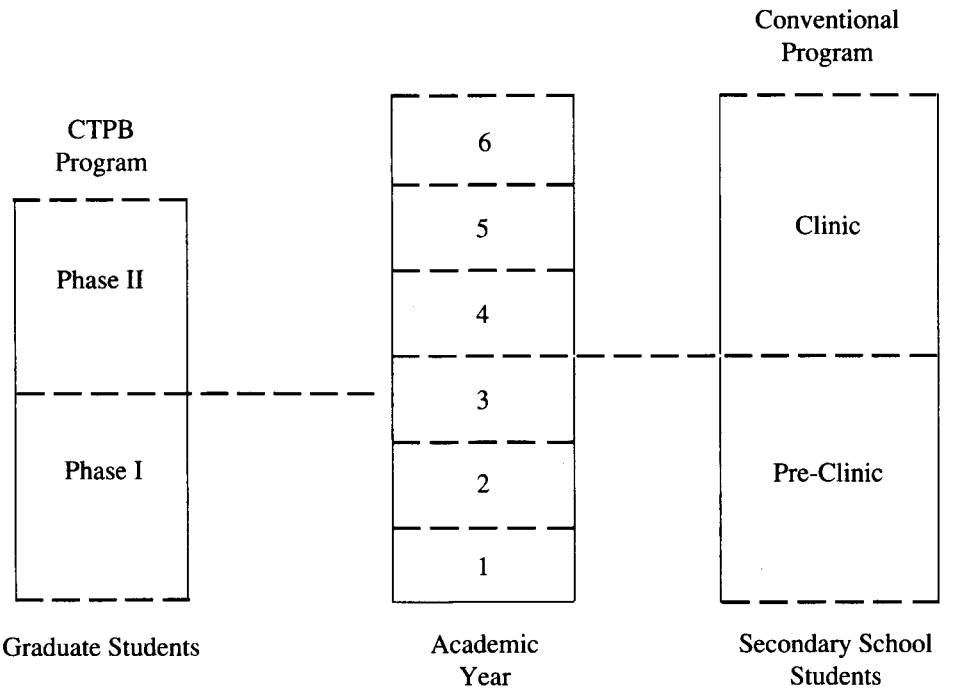

Diagram 1. Curriculum structure of CTPB and conventional program.

The first examination average scores of the innovative students were less than those of the conventional students in physiology, parasitology, pathology, epidemiology, biochemistry and microbiology as statistic descriped in table 2. The average score in each confent presented by figure 1.

Table 2. Students' Achievement in Basic Medical Sciences of CTPB 1st Test and 4th year Conventional Program.

Content	Total Scores	Mean Score		Standard Deviation		t-Value
		CTPB 1st test	4th Yr. Stu.	CTPB 1st test	4th Yr. Stu.	
1. Anatomy	10	4.16	4.88	1.34	1.41	-1.782
2. Physiology	10	6.58	7.33	1.22	1.05	-2.308*
3. Parasitology	10	5.11	7.18	1.15	1.69	-4.673***
4. Pathology	11	3.63	4.52	1.54	1.03	-2.465*
5. Laboratory Medicine	11	5.95	6.18	1.08	1.31	-0.639
6. Pharmacology	15	7.21	7.49	1.75	2.35	-0.445
7. Epidemiology	16	3.26	5.67	1.24	1.78	-5.139***
8. Biochemistry	18	7.84	9.30	2.09	2.07	-2.409*
9. Microbiology	24	8.42	12.85	1.77	2.88	-5.978***
10. Community Medicine	25	12.05	11.64	2.50	2.28	0.595
Total	**150**	**64.21**	**77.03**	**6.29**	**7.94**	**-5.951*** **

* $P < 0.05$ *** $p < 0.001$

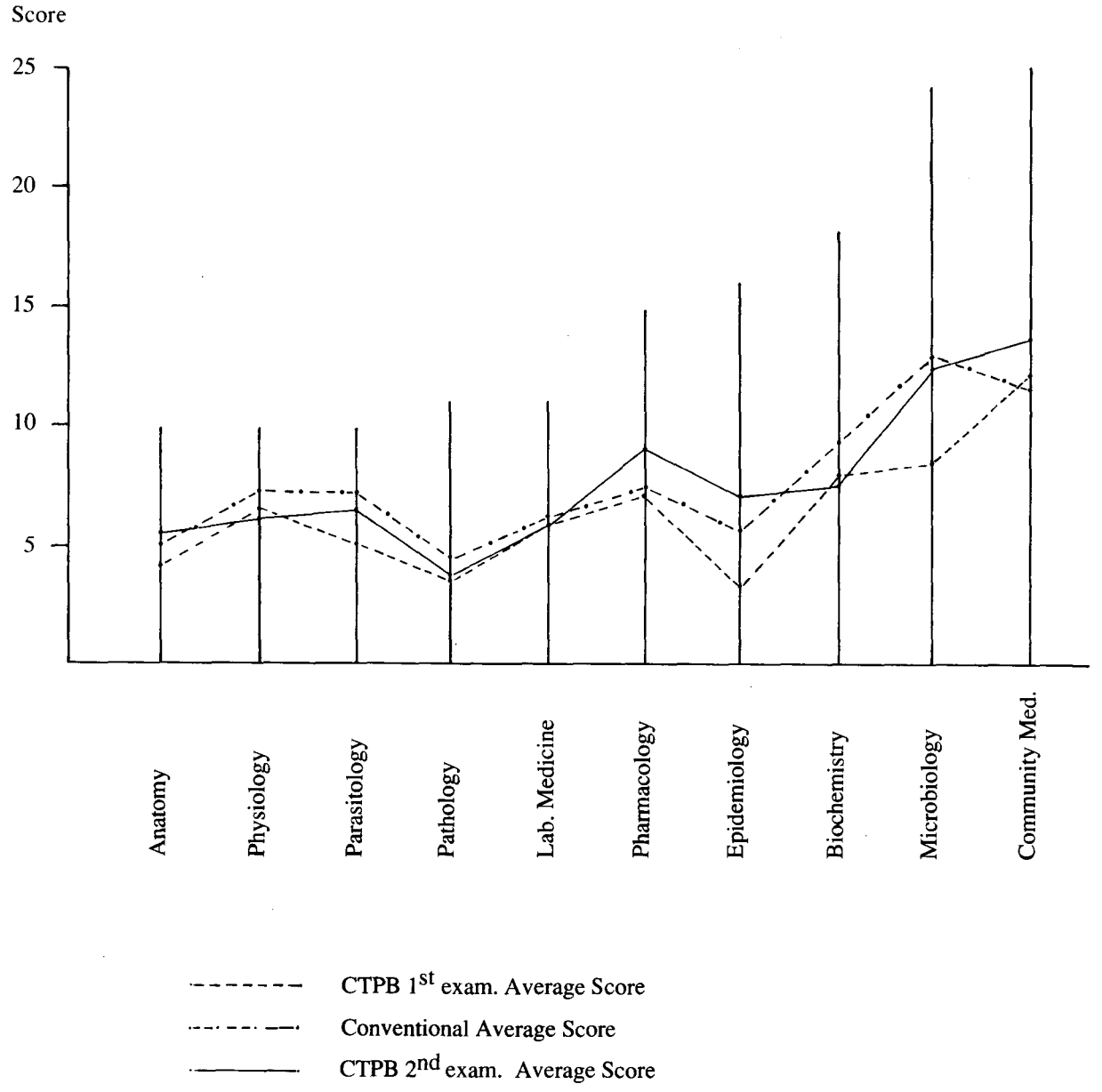

Figure 1. The average score of CTPB and conventional students in basic medical sciences.

Another comparing average scores of innovative students in both tests, those of the second test were higher including anatomy, and pharmacology was increased more significantly as in table 3.

Table 3. Analysis CTPB Students' Achievement Progress in Basic Medical Sciences.

Content	Total Scores	Mean Score		Standard Deviation		t- Value
		1st Test	2ndTest	1st Test	2nd Test	
1. Anatomy	10	4.16	5.42	1.34	1.30	-2.864**
2. Physiology	10	6.58	6.16	1.22	1.26	1.024
3. Parasitology	10	5.11	6.53	1.15	1.43	-3.302**
4. Pathology	11	3.63	3.74	1.54	1.52	-0.216
5. Laboratory Medicine	11	5.95	5.84	1.08	1.21	0.289
6. Pharmacology	15	7.21	9.00	1.75	1.80	-3.034**
7. Epidemiology	16	3.26	7.05	1.24	1.90	-7.151***
8. Biochemistry	18	7.84	7.63	2.09	1.64	0.339
9. Microbiology	24	8.42	12.37	1.77	3.00	-4.817***
10. Community Medicine	25	12.05	13.47	2.50	1.93	-1.919
Total	**150**	**64.21**	**77.21**	**6.29**	**6.90**	**-2.485***

* P < 0.05 ** P < 0.01 *** P < 0.001

Otherwise, the statistics showed that conventional students' average score in physiology and biochemistry are higher than those of innovative students' second examination. On the contrary, the result in the area of community medicine is converted as described in table 4.

Table 4. Students' Achievement in Basic Medical Sciences of 4th year Conventional Program and CTPB 2nd Test.

Content	Total Scores	Mean Score		Standard Deviation		t- Value
		4th Yr. Med. Stud.	CTPB 2nd Test	4th Yr. Med. Stud.	CTPB 2nd Test	
1. Anatomy	10	4.88	5.42	1.41	1.30	-1.007
2. Physiology	10	7.33	6.16	1.05	1.26	2.647*
3. Parasitology	10	7.18	6.53	1.69	1.43	1.040
4. Pathology	11	4.52	3.74	1.03	1.52	1.618
5. Laboratory Medicine	11	6.18	5.84	1.31	1.21	0.681
6. Pharmacology	15	7.49	9.00	2.35	1.80	-3.528***
7. Epidemiology	16	5.67	7.05	1.78	1.90	-1.935
8. Biochemistry	18	9.30	7.63	2.07	1.64	2.218*
9. Microbiology	24	12.85	12.37	2.88	3.00	0.420
10. Community Medicine	25	11.64	13.47	2.28	1.93	-2.171*
Total	**150**	**77.03**	**77.21**	**7.94**	**6.90**	**-0.081**

* P < 0.05 *** P < 0.001

Discussion

The first group of CTPB students acquired the same level of knowledge in basic medical sciences as students in a conventional program of study. Students in the conventional program acquired knowledge of the basic sciences during the first through the third year prior to the start of clinical studies during their fourth through sixth year. The students in the innovative program acquired integrated knowledge of those sciences from the beginning through the end of the five-year curriculum. The achievements of the latter group corresponded with program expectations since the average score at the end of Phase II (or the fifth year of study) was higher than at the end of Phase I of the innovative program. The average scores of the CTPB students increased since their second examination in every subject except Biochemistry and Physiology; it may be noted that their average scores in Pharmacology were above those of the fourth-year students in the conventional program. In addition the students in the innovative program had strong points in Community Medicine,which shows that their achievement occurred in line with the concept of integrating problem-based learning with the basic sciences, clinical sciences and community experiences from the beginning until the end of the program. If it were otherwise, the results relating to the comparison study on cognitive evaluations of the primary care curriculum (PCC) and conventional track students concerning their ability to learn scientific information on a pure, memory-based approach would be different. However, there was no significant difference on NBME Parts I or II in terms of total scores, but in 1981 the first PCC class on NBME Part I performed significantly lower only in Anatomy.(1) There were further suggestions with regard to preparing and counseling the students in the low score group so that they could improve their academic performance. These suggestions included one calling for remedial activities so that each student would have a chance to earn at least the minimum passing grade; howevers that formative program was terminated.(2) Eventhough this study had weakness in the second examination against conventional students because of some limitation. This study provides some preliminary data which can be used for further detailed studies on the strengths and weaknesses of other areas of the CTPB program.

References

1. Arthur Kaufman. Implementing Problem-Based Medical Education. New York : Springer Publishing Company 1985: 185-8
2. I.S. Urdaneta. Improving Learning in Anatomy through Formative Assessment and Remedial Activities. International conference Proceedings, Ninewells Hospital and Medical School, Dundee : Scotland, 1992: 136