

Feasibility of Basic Sciences: Short Course for Postgraduates

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ABSTRACT

Backgrounds and objectives: Students' retention of basic sciences after the preclinical years is generally poor. Revisiting to basic sciences improves clinical acumen. But to have such program is a challenge, especially for postgraduates (PGs). Studies regarding integration of basic sciences for PG students are not available. Hence, this study was planned to formulate, implement, and measure short-term outcome to determine the feasibility of the short course on basic sciences.

Materials and methods: An interventional study with mixed-methods approach. *Study subjects:* First-year PGs. *Study tools:* (1) Pretested, semi-structured feedback questionnaire for PG students and teachers; (2) posttest questionnaire: Multiple choice questions based on case scenarios. *Outcome indicator:* (1) Feasibility indicators: $\geq 85\%$ positive attitude of the teachers and students; (2) posttest score of $\geq 50\%$ of at least 80% students; (3) investigator's daily report. *Statistical analysis:* Percentages.

Results: Conduction of program was smooth and investigator did not face any major hurdles. Out of 25 students, 24 attended the course and 21 (87.5%) found the program useful. Average performance on posttest was 70.5%. This interaction has made the students feel free to contact teachers in future if needed. Out of 20 teachers, 15 (75%) felt the program useful and should be continued next year with some changes. On "SPICES" model, curriculum was not extreme left or right.

Conclusion: It is feasible to conduct a basic sciences short course for PGs and that can be continued with appropriate changes in topic selection.

Keywords: Basic sciences course, Integrated teaching, Postgraduate students.

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INTRODUCTION

Medical colleges in India usually follow a traditional curriculum with a high degree of compartmentalization

into subjects of basic sciences: Preclinical, paraclinical, and clinical branches. Regulations on "Graduate Medical Education, 1997" recommended a teaching approach characterized by maximal efforts to encourage integrated teaching between traditional subject areas using a problem-based learning approach and deemphasize compartmentalization of disciplines so as to achieve both horizontal and vertical integration in different phases in order to provide the students with a holistic rather than fragmented learning perspectives.¹ The theory of "conceptual coherence" explains the role of basic science in enhancing diagnostic accuracy. It suggests that students do not rely solely on memory to arrive at the correct diagnosis. Rather, because they understand why certain features occur, students with basic science knowledge are able to make the diagnosis that "makes sense" rather than simply focusing on the presence or absence of individual features.²⁻⁴ Students' retention of basic sciences material after the preclinical years is generally poor, which is independent of marks of final examination or the course quality. Knowledge loss is multifactorial like poor initial learning and lack of reinforcement.⁵ Lack of reinforcement over time can be considered as a program deficiency and needs corrective steps. However, interdisciplinary integration of basic sciences during the clinical years remains a challenge.⁶ Integration of basic sciences for postgraduation will definitely help the PG student to improve their diagnostic accuracy and clinical expertise. Therefore, this study was planned to find out the feasibility of basic sciences short course for PGs.

MATERIALS AND METHODS

An interventional study with mixed-methods approach was conducted after appropriate ethical clearance.

Study subjects were the first year PG students admitted in May 2015 in Bharati Vidyapeeth Deemed University Medical College and Hospital, Sangli, Maharashtra, India. All PG students from various departments with PG course were included. These were Community Medicine, Pathology, Medicine, Surgery, Obstetrics and Gynecology, Orthopedics, Pediatrics, Psychiatry, Radiology, Ophthalmology, Otorhinolaryngology, and Anesthesia.

Study Tools

Three study tools were used:

1. Pretested, semi-structured feedback questionnaire for PG students.

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2. Pretested, semi-structured feedback questionnaire for teachers.
3. Posttest questionnaire was developed, which included multiple choice questions (MCQs) based on case scenarios.

Work Plan

- *Development of curriculum:* Curriculum was developed as per students' need and respective departments' teacher input by holding meetings.
- A meeting of Medical Education Unit (MEU) was held to decide goals and objectives of course and to plan a tentative program.
- Second meeting of MEU members and head of departments (HODs) of all concerned departments was held to prepare a list of probable topics and to decide appropriate Teaching learning methods.
- Departments involved were Anatomy, Physiology, Biochemistry, Pathology, Microbiology, and Pharmacology.
- *Schedule:* A week was given to each department, June to July afternoon, 2.30 pm onward.
- *Communication:*
 - All HODs were communicated in the College Council Meeting. A circular stating the schedule and venue was circulated as a hard copy to the concerned departments.
 - First-year PG students were communicated via WhatsApp group and above-said circular.
- After the first lecture in each department, students were asked to give list of topics which they felt were relevant.
- *Flexibility:* Attendance in Anatomy was kept flexible. Anatomy topics were different for various PG courses, which was designed as per student's demand. So students attended only the lectures they had proposed and those relevant to their course. These changes were made after the course started. Also, posttest was not conducted by Anatomy Department as it was not feasible to frame different set of MCQs for various PG students attending their lectures and due to the last minute changes in the curriculum as per the student feedback.
- Posttest was conducted by all departments except Anatomy (reason as stated earlier). Posttest was conducted using MCQs of various levels using Bloom's Taxonomy.
- This program was compulsory for all PGs and attendance report was maintained.
- At the end of the program, students were provided with preformed and pretested questionnaire. They were assured of anonymity of feedback.

- Teachers' feedback was obtained. For assessing the feasibility, the following outcome indicators were decided:
 - *Feasibility indicators:* $\geq 85\%$ positive attitude of the teachers and students.
 - Posttest score of $\geq 50\%$ of at least 80% students.
 - Investigator's daily report.

Statistical Analysis

Percentages were calculated

RESULTS

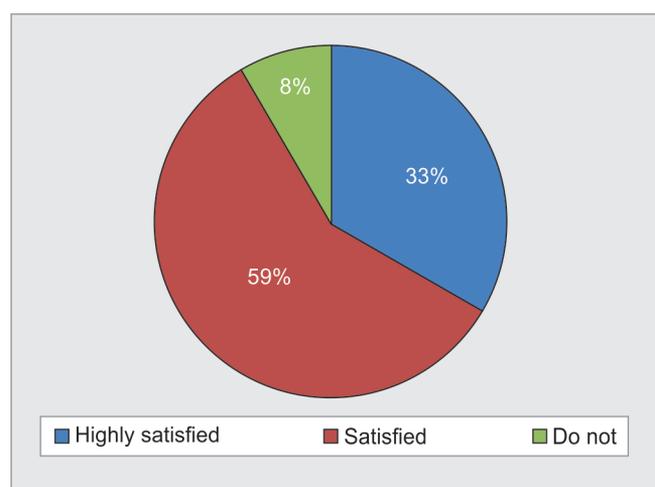
Totally, 25 PG students took admission. Out of 25 students, 24 [16 (66.66%) boys, 8 (33.33%) girls] attended the course. The number of students in each department was: 2 in Community Medicine, 2 in Pathology, 3 in Medicine, 2 in Surgery, 2 in Obstetrics and Gynecology, 2 in Orthopedics, 4 in Pediatrics, 1 in Psychiatry, 1 in Radiology, 2 in Ophthalmology, 1 in Otorhinolaryngology, and 3 in Anesthesia.

According to 21 (87.5%) students, the program was useful, while 3 (12.5%) were uncertain about its utility (Graphs 1 and 2).

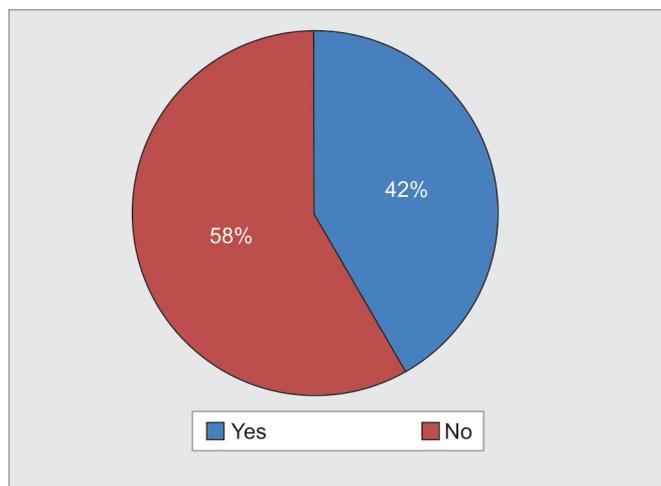
- 10 (41.7%) students felt need for improvement, like addition of some topics, hands-on experience (e.g., conduction of tests, smear reading), and dissection.
- According to students, this interaction has made them feel free to contact teachers in future if needed (Graph 3).
- *Posttest results:* Totally, 18 students responded. Range: 61 to 80% (73–96 marks out of 120). Average performance was 70.5%.

Teachers' Feedback

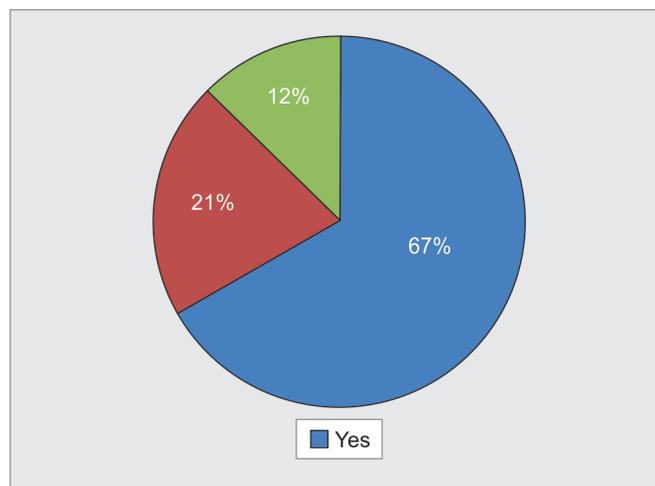
Totally, 20 teachers were involved in conducting this program.



Graph 1: Students' satisfaction



Graph 2: Need for improvement: students' view



Graph 3: Feel free to contact teachers

According to 15 (75%) teachers, the program was useful but 5 (25%) teachers felt it was not useful. Totally, 15 (75%) teachers felt this program should be continued next year, 4 (15%) should not, and 1 (5%) can not say. A reason for saying "No" was that students were not interested, and this reply was given by 2 (10%) teachers.

Following are the suggestions given by teachers:

- Increase time period for course: 1 (3.70%)
- Regularity of attendance: 8 (29.62%)
- Topic selection needs improvement: 10 (37.03%)
- Reduce time period of the course: 1 (3.70%)
- Students are not interested: 4 (14.81%)
- Take suggestion of topic from student: 2 (7.47%)
- Punctuality of students: 3 (11.11%)

Curriculum on "SPICES" model: Curriculum is not on extreme left or right.

DISCUSSION

Integrating knowledge of basic science with clinical science has been suggested in Vision 2015 as well as by other medical educators across the country.⁷⁻⁹ Since 1980, many studies have been done based on the role of basic science and clinical knowledge in diagnostic reasoning.¹⁰⁻¹⁴ We formulated and implemented a short course on basic sciences for newly admitted PG students. Students' feedback was collected: 87.5% students found the program useful; 92% students were satisfied with the program; 88% students found the teachers approachable. Students' feedback had $\geq 85\%$ positive attitude, which ensures the feasibility of the program. The academic programs in medical institutions should be able to create valuable and enriching learning experiences as meaningful learning experiences are an essential key to student retention of knowledge. When meaningful learning experiences are missing from the curriculum, students often become disengaged and dissatisfied because they see no

relevance in what they are learning. Moreover, students with few chances to participate in meaningful learning experiences are denied the opportunity to integrate and apply the knowledge they have obtained in their classes.

Most of the studies done earlier have introduced this program for senior undergraduate medical students but in our study freshly joined PG students were included. Indian references for such programs are not found to be published. Internationally also, limited number of medical schools have published descriptions of successful basic science curricula for their senior medical students. Patel¹⁵ has documented the success of the program of integrating basic science in final year students as Hawthorne effect (Observer effect). Similar effect in our study could be a reason for successful implementation of our program.

In our study, 42% students suggested need for improvement in the program. They asked for hands on dissection, smear preparations, laboratory tests, etc. The posttest result of students was 70.5%, which was an average performance and calls for identifying inadequacy in the program; 25% faculty were uncertain about the usefulness and continuation of the program. Less student attendance in some lectures was perceived as inadequate interest of students by those teachers. As opposed to that, 75% teachers found the program useful and supported continuation for further batches. Teachers also suggested for revision of topics and suggested student participation for topic finalization. Schmidt¹⁶ included eight schools that participated in a project "Preparing: Physicians for the future: Program in medical Education." He described problems encountered during integration of basic sciences, clinical sciences, and biopsychosocial issues, resources needed to support interdisciplinary courses, benefits of integration, and common lessons learned. A study by Rudich and Bashan⁶ described their 3 years' experience in implementing an interdisciplinary course designed to demonstrate the continuum of medical

information from clinic to the basic sciences for senior medical students, including graduate research students. Their achievement was moderate to good, similar to our study.

Student's insight regarding benefit from the program could be a reason for positive feedback. A study by Stalburg and Stein¹⁷ has described their preliminary experience of integration and collaboration between traditional basic and clinical science faculty regarding development of women's health curricula. A study by Spencer et al¹⁸ confirmed that by returning to basic sciences in the senior year of medical school, when students' clinical reasoning and analytical skills are more mature, students gain more meaningful understanding of the pathophysiology of the diseases and targeted therapeutics.

Around 67% students felt free to contact teachers. Role modeling is thought to be an integral component of medical education. We identify people as role models when they inspire imitation and influence people working with them to develop new skills and achieve their potential.^{19,20} The findings indicated that good teachers are enthusiastic, friendly, easy-going, able to develop rapport with learners, committed to the growth of their students, approachable, interested in learners as people, and always conscious of their status as role models.

On "SPICES" model, curriculum is not on extreme left or right. Learning can be structured to meet students' needs and curriculum requirements. In this study, integration of different subjects chosen by students and teachers was formulated and implemented, presuming to benefit the student's clinical acumen without perturbing the teacher's schedule.

A study by Anique supported Schmidt and Boschuzien model, which suggested that basic science knowledge is activated in expert diagnostic reasoning through its relation with clinical knowledge.²¹ Study by Norman et al²² showed that when experts are confronted with very difficult cases they make extensive use of basic science explanations. Therefore, such programs should be appropriately modified and continued.

CONCLUSION

Students' satisfaction was high and also they found it to be useful although their performance was not up to the mark. Majority of teachers found the program to be useful and were in favor of continuing the program. Based on the outcome indicators, this program is marginally deficient, which can be made effective on implementing suggestions from students and teachers.

On "SPICES" model, curriculum is not on extreme left or right. Hence, course in basic sciences for PG student is useful and can be continued.

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